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Steam Generators.

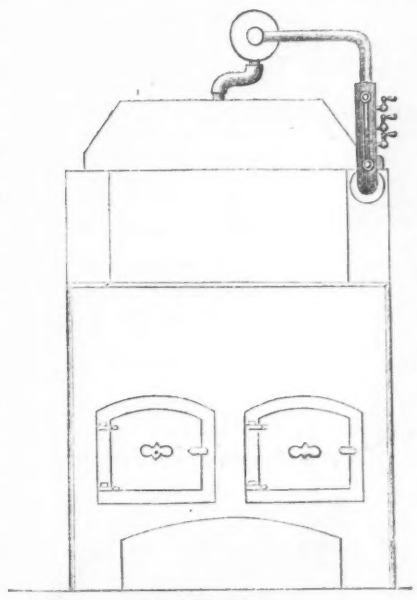
THE term steam boiler is legalized by usage, but is very inappropriate in all cases where the contrivance arranged for generating steam consists of a system of tubes, or other arrangement different from what we understand by the word boiler. Strictly speaking, a steam boiler is a water boiler for the generation of steam; the word steam generator is, however, applicable to all.

It is clear that in every apparatus of this class the heat is communicated to the water by being transmitted through the metal of which it is constructed; this being always a good conductor, there is no difficulty in such transmission. But since water is a bad conductor, a thorough uniform heating of the whole would be an impossibility, were it not that a peculiar property of this fluid came to the rescue. This peculiar property is the slight expansion of water by heat, by means of which the heated particles become lighter, move upward, and make place for the colder particles, which in their turn become heated. In this way a system of currents is produced, which, in the common boiler, go on slowly and are left to mere chance, while in more perfect systems of steam generation these currents are compelled to move rapidly and systematically by means of the proper arrangements.

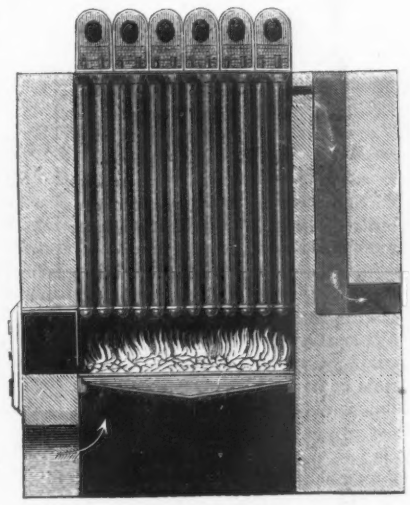
Since the steam is developed only in those parts of this water-boiler where fire at the outside is in contact with the metallic surface, having water at the inside, it is clear that the amount of steam a boiler is capable of producing in a given time is exactly proportional to this heating surface; and as for the development of a certain amount of power in the engine a certain amount of steam is required, it follows as a necessary consequence, that the amount of heating surface of a steam-generator must be proportional to the power of the engine to be supplied with steam. The commonly adopted estimate is, as all engineers know, for the old style of boilers, about fifteen square feet of boiler surface for every horse power of the engine. A common cylindrical boiler without flues or tubes, for say fifty horse-power, would therefore require a bottom exposed to the fire of seven hundred and fifty square feet. This would be obtained by means of a boiler ten feet in diameter and seventy-five feet long. Such a boiler would have a cubic capacity of nearly six thousand feet, and when supplied with thirty thousand gallons of water would have a steam-space of over two thousand cubic feet. Such a boiler is, of course, too large and heavy, and requires too much water to be practical. To this an other objection must be added, namely, that the thickness of the metal of which the boiler is made must be increased in proportion to its size, as the strain on the metal is measured by the total pressure on the whole surface. In case of the boiler, supposed it would amount, per 3 atmospheres or 45 pounds pressure per square inch, to the enormous amount of 16,200,000 lbs., or about 8,000 tons, as is easily found by calculating its surface, which is about 2,500 square feet, or 360,000 square inches, and multiplying this by the 45 lb. pressure per square inch. It is clear that in a boiler of one-half or one-third the above dimensions, the surface will be only one-quarter or one-ninth as much, as also the total pressure, and consequently the strain; the metal may therefore be less heavy.

The amount of water necessary in this case can only be one-eighth or one-twentieth of that required in the first instance, in accordance with the mathematical law that the surfaces are as the squares, and the cubic contents as the cubes of the corresponding dimensions. This same measuring shows also why tubes of very small diameter can withstand enormous pressures, even when made of very thin metal.

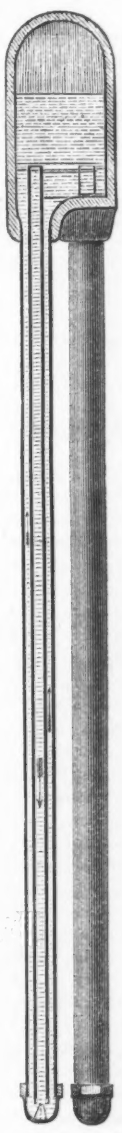
We have made this little calculation intentionally, so as to show more forcibly the advantages of interior flues and tubes in boilers, as by them we increase the heating surface enormously without increasing the bulk and weight; and at the same time we diminish the amount of water in the boiler. If now such tubes are an advantage, and experience has proved this, as also that the advantage becomes greater the larger the number of tubes employed, the next question is: Why not make the boiler entirely of tubes—or, rather, why not do away with the boiler altogether, and keep tubes alone? By doing this, we should, of course, put the water in the tubes, and expose them to the fire, and in this way obtain an enormous amount of heating surface with a minimum amount of water. But a practical difficulty of another nature presents itself, namely: The steam, as it is being generated, drives the water out of the tubes, thus destroying the permanent contact between the heating surface and the water, which is necessary to a steady and abundant supply of steam. This difficulty can only be overcome by means of a peculiar arrangement for insuring systematic circulation. The matter should not be left to chance, as is the case with many steam generators. The most effective arrangement of this kind is, undoubtedly, that adopted in Wiegand's sectional steam generator, represented by the annexed figures. In it a continuous circulation is maintained in each tube by means of a central tube, open at both ends, through which the heavier water continually flows downward to the bottom of the steam generating tube. By this arrangement the ascending bubbles of steam cannot intefere with the continually descending water supply. A second advantage is, that, with this regular circulation, the amount of heating surface wasted in proportion to the horse-power employed is reduced almost one-half, and is only required to be from 8 to 9 square feet per horse-power. The systems of tubes mentioned are connected in sections.



Front Elevation.



Sectional Elevation.



Section of Tank and Tube.

WIEGAND'S PATENT SECTIONAL NON-EXPLOSIVE STEAM GENERATOR.

Each section is a strong, steam-tight tank, eight inches wide, fourteen inches high, and sixty inches long, having two rows of funnel-shaped apertures or bosses, twelve in each row, in the bottom, into which are screwed twenty-four lap-welded wrought-iron tubes, two and one-fourth inches external diameter, and four feet long. Each tube is closed at its lower end by a cast iron cap or cup screwed upon it. The cap or cup is cast with three wings, that form a small fluted pyramid in the bottom. At a short distance above, and parallel with, the bottom of the tank, is a perforated plate which separates it into two chambers. Within each tube is another tube of smaller diameter that is supported upon the pyramid in the cap, and extends up through the perforated plate, in which it fits loosely into the upper chamber of the tank. The arrangement permits an uninterrupted flow of water from the upper chamber of the tank through the inner tubes into the cups; from thence upward through the annular spaces between the inner and outer tubes into the tank underneath the perforated plate, and through the perforations back into the upper chamber. Water is supplied to, and blown off from the tank through the same orifice, which is placed in the bottom of one end of the tank, and the steam is taken from the top. A sectional view of the tank, plate, tubes, and caps is shown in the illustration.

The furnace is a rectangular chamber with vertical walls, having the usual ash-pit and grate bars, and a castiron front. Apertures, properly proportioned, are left in the four walls of the furnace, near the top, for the more equal distribution of the heat among the tubes, opening into a small chamber, from which the draft passes into a flue or chimney at the back as in other furnaces. The form of the furnace, however, may be modified to suit the fuel, etc.

The generator consists of a number of these sections placed close together upon the top of the furnace, with the tubes hanging in it. They are connected together by the water-supply pipe and the steam-drum as shown in the illustration. The steam-drum may be made either of cast or wrought iron, and of any size required.

When in use, the tanks are filled with water above the level of the perforated plates; upon lighting the fire in the furnace, the water contained in the annular spaces between the inner and outer tubes becomes heated and rises, while the water contained in the inner tubes being cooler and specifically heaver, descends to supply its place.

Thus all the water contained in the generator is continuously brought into intimate contact with the heating surface, and a rapid generation of steam is the result. Steam has been raised to 80 pounds pressure from cold water in a generator of 320 horse power in 20 minutes.

It will readily be seen that the heating surfaces of the generator are of the most efficient character, nearly all the heat generated in the furnace being utilized in the production of steam. It is capable of evaporating a much larger quantity of water per hour, with a given amount of fuel, than can be done in boilers of other construction. The circulation is so rapid that sediment remains suspended in the water and gradually finds its way to the supply pipe, from whence it is easily blown off while in operation, while the surface of the tubes and cups remains free from any deposit or scale, and constantly maintain their efficiency. The perforated plates, in the tanks, perform other functions besides merely holding the upper ends of the internal tubes in proper position—they prevent the rising currents, between the internal and external tubes, from interfering with the entrance of the descending currents into the internal tubes, and also break the bubbles of steam as they rise, so that they separate from the water without carrying any up in the form of spray, and thus avoid the evils which engineers call foaming or priming. Should the water, through inattention or other cause, fall below the perforated plates, circulation ceases; the water in the tubes boils up into the tanks, a cap becomes overheated and cracks, permitting the gradual escape of steam into the furnace. The same event will happen if a tube should become obstructed.

The following facts are evident: that the contents of the generator are contained in compartments so small that the breaking of one cannot do anything worse than gradually to empty the apparatus; and the caps or cups, being the weakest and most exposed to heat, will break before any other part, and, when broken, are easily replaced, at low cost, without disturbing any other portions. *Each of the cups is, in effect, a safety valve;* and since the injury from explosions is due to the reaction from the sudden escape of a large volume of steam or water, *an explosion is impossible,* because there is no large volume of steam or water present. All portions of the generator being secured by screws of uniform standard sizes, it can be shipped in parts, and erected by persons of moderate mechanical skill, and can, with equal facility, be repaired by them. Each section contains sixty-six square feet of heating surface, and is rated at eight horse power. Six sections, with the requisite masonry, will occupy a space six feet in front, nine feet in depth, and ten feet in height, measuring from the bottom of the ash pit to the highest point.

This economy in space permits the erection of the generator in positions where no other boiler could be set, and at the same time saves a large proportion of the masonry required in the setting of boilers.

Its compactness and lightness recommend it highly, in comparison with any boiler now used; and its remarkable property of remaining free and clean from incrustation or scale, affords an advantage not heretofore realized. The invention can be

used wherever steam is used. It has been used with advantage in the heating of houses during the past winter, and has been adopted by the largest establishments in this city engaged in that business. It is now in successful operation in mills and manufacturing establishments from eight horse power up to three hundred and twenty; in every case effecting a saving of from one-quarter to one-half of the fuel used, over boilers of other construction which it has replaced. Communications should be addressed to The Steam Generator Manufacturing Co., No. 528 Walnut Street, Philadelphia, Pa.

Under the Channel.

UNDER the above title, the London *Engineering* has the following article upon the proposed tunnel between England and France, as a leader in one of its late issues. It will be read with interest as embodying the views of the editor of *Engineering* upon one of the greatest engineering enterprises ever yet conceived of:

"Without entering, here, upon the question whether a channel tunnel would be desirable in the interests of commerce and international peace, it is sufficient to ask whether it is possible of execution. There is a great amount of geological evidence to show that it is, but the fact of possibility can only be settled by actual trial. Shall this, need this, trial be longer delayed? So far as English feeling has been enlisted in the matter—and the signatures to the address to the Emperor of the French upon this very subject show the representative character of those who spoke for the nation—it is due to Mr. Hawkshaw to record that he, more than any other of the enterprising projectors and engineers who have been associated with this grand scheme, has drawn towards it English influence of the most powerful kind—an influence virtually assuring the provision of that other powerful lever—capital. Mr. Hawkshaw's plan—and we must mention with his name those of Mr. Brunlees, Mr. Low, and M. Thomé de Gamond—is almost too well known to require a descriptive repetition. It is for a tunnel, some 300 feet beneath the bed of the channel, through what all geological evidence tells us is gray chalk, bang across from the South Foreland to near Cape Gris-nez. If the geological evidence can be trusted, the tunnel is unquestionably practicable. It would take a long time to make; it would cost a very large but indefinite sum of money, a sum of money to be extracted chiefly from the pockets of John Bull. But there remains the great uncertainty, so far as John Bull is concerned, of all geological evidence of anything. But this uncertainty admits of solution—at some expense certainly, and at some personal risk undeniably. If a boring no larger even than a foot in diameter could be carried across, from England to France, a submarine tunnel would be perfectly practicable. It is only requisite to make the boring, not of a foot in diameter, but say 9 feet wide and 6 feet high, to settle the question of practicability. There is no difficulty in respect of ventilation. Compressed air, forced in through mains of moderate size, will accomplish that as well under the channel as in the Mont Cenis tunnel. Mr. Chesbrough carried his sub-lacustrine tunnel two miles out from Chicago, under the bed of Lake Michigan, with no difficulty in respect of ventilation. And it was a tunnel of hardly more than 5 feet in diameter.

"Mr. Hawkshaw has proposed to make a pair of parallel headings 9 feet square, to ascertain whether the tunnel be practicable or not. The proposition amounts, virtually, to the assumption that the tunnel is practicable, in which case the full section might as well be opened out at once. The two headings would not only be needlessly high, but they would require two or three times the number of men, and the corresponding personal exposure involved in a single heading of one-third their combined total sectional area.

"We are vexed beyond the measure of ordinary dissatisfaction at the suggestion in the engineer's report, that any probable influx of water into the tunnel workings could be readily dealt with. As for water of infiltration it could be, without doubt. But as for water actually working through fissures, under a pressure of 225 lb or 250 lb per square inch, God help the tunnel men when it reaches them! For a fissure of the section of a quarter of a square inch would be abraded to one of a quarter of a square rood before the men could get away to the shaft, five or ten miles off. Yet there are men who will readily take the risk, and a skilful general would utilize such men in a spirited enterprise. But he would not expose twice or three times the necessary number of men to destruction in a mere *reconnaissance*, and Mr. Hawkshaw's double-barrelled headings would be nothing more. The single heading, apart from the curious theory of ventilation advanced in the initiative report, would test the whole question of practicability. The Channel tunnel is one of the very few tunnels of which the termini can be sighted from either end. There is no question as to the direction, and the headings might be driven from the respective coasts to meet within half an inch, although a difference of half a yard would not greatly matter.

"If there be any monetary spirit yet left in England and France, let the practicability of this great work be ascertained. If it be practicable, it is certain to be carried through. It may require ten or even twenty years, and ten, twenty, or forty millions to carry it through, but we can afford to wait, and the capital will not be wanting, even if Parliament is called upon to raise the English half of it. But nothing in all this need for one hour deter the completion of Mr. Fowler's great scheme of a Channel ferry. Nothing is more needed. It can be carried out as fast as money can be supplied to carry it out. It will "do" for the present, and do well, and the "present," that is the ten or twenty years pending the opening of the tunnel, is a long while. To the tunnel, if the tunnel be possible, we must come at last, but we can try the ferry meanwhile, and a high class Channel ferry would be immensely popular from the hour of its establishment."

Fires in Mines and the Means of Extinguishing them.

BY R. P. ROTHWELL, ENGINEER.

IN the first article of this series, found in THE JOURNAL of July 27, we noticed the different methods which can be adopted to *prevent* the occurrence of fires in mines, viz., a well arranged system of mining and ventilation; greater care in the establishment of underground furnaces; strict rules to meet the danger arising from carelessness or ignorance of the workmen; greater precautions to prevent the ignition of fire damp from lamps or from blasting; and, finally, the various means of preventing the spontaneous ignition of the coal. In the present and following papers we have to meet the enemy face to face. Given a mine on fire, we have now to consider the methods by which we can extinguish it. Our remarks refer, in general, to coal mines as being by far the most subject to this class of accidents, and as offering, beyond all comparison, the most difficult cases to treat.

There is no more essential condition of success in combating fire in a mine than *promptness* in the application of the means to be adopted. When a fire originates in coal or timber, every effort should be *immediately* made to extinguish it by throwing water on it either with buckets, or better, with a fire engine; or where practicable, by tapping the column-pipe of the pump and leading the water through hose to the seat of the conflagration. In some cases the use of portable "fire extinguishers" (which generate carbonic acid gas), such as are now found in every village of the land, may prove of great service. If the fire originates by the ignition of a blower of fire-damp, efforts should be made with wet cloth, water, etc., to put out the flame; in some cases where these means failed, the flame has been extinguished by the concussion of the air, caused by discharging a cannon in the gallery where the fire exists. When the coal surrounding the "blower" has already become ignited it will immediately re-ignite the fire-damp;—so that this method can only be applied either where the blower is in rock, or where it has not had time to thoroughly ignite the coal. While these means are being applied preparation should be made for erecting stoppings or dams, in view of the failure to extinguish the fire by the direct means, yet these should not be abandoned till there is no further possibility of success. When it is no longer possible to approach the fire near enough to throw water on it—that is, when the fire can no longer be kept under control—it becomes necessary to resort to other methods of extinction, viz.:

By isolating the part of the mine on fire, and then applying extinguishing agents to the part enclosed; when this fails or becomes impracticable there remains but one other method, viz.:

By closing the entire mine, and applying the same extinguishing agents.

These agents are water, carbonic acid and nitrogen gases, steam, or any other gas incapable of sustaining combustion; those mentioned being adopted on account of their effectiveness and small cost.

The isolation of a fire in a mine is effected by constructing walls or stoppings across all the galleries or other openings which connect this portion with the remainder of the mine. These stoppings are sometimes walls of brick or masonry, varying in thickness from twelve inches to six or eight feet; at other times two lighter parallel walls are built, and a current of air allowed to circulate between them in order to keep the inner wall cool, or else the space between the walls is filled in with clay and mine-waste; while still another method is to make a stopping, several yards in thickness, entirely of clay, waste, etc. In cases where it can be done without danger, a timber stopping or even a simple board bratticing can be adopted, the kind of stopping as well as its strength will depend on the position of the fire, its extent, the presence or absence of fire-damp—whether the stopping is intended to dam back water or not, and such like considerations, which, under the enunciations of fixed dimensions, are impracticable. The *essential* in every case is that the stopping should be *air-tight*, and that it should be constructed with the least possible delay, and at such a distance from the fire as to allow time for its completion, before the smoke and irrespirable gases produced by the fire can prevent the men from working.

Notwithstanding that the ventilation of the part on fire has been reduced to a minimum by the erection of temporary bratticing, etc., yet the combination of the coal and wood produces such enormous volumes of irrespirable gases that the work of building the stoppings is one of great difficulty and danger, more particularly in mines producing fire damp, where the danger from explosion is still greater than that from the gaseous products of combustion.

It is evident that the stoppings can be constructed with least difficulty by commencing with those on the "outside" of the fire, or the side from which the air *proceeds to* the fire, and afterwards building those "inside" the fire, or where the air *comes from* the fire; yet in mines yielding fire damp this method of proceeding is attended with great danger; the fire damp mixing with the air confined between the stopping and the fire makes an explosive compound, which is carried forward towards the fire, where it ignites, and though it may not cause a fatal accident, yet it almost invariably throws down the stoppings by which it was sought to isolate the fires. As from one-tenth to one-seventh of its volume of carbonic acid, added to an explosive mixture of air and fire damp, renders the latter entirely inexplosive, (a larger quantity renders it incapable of sustaining combustion,) and as the products of combustion are carbonic acid and nitrogen, it follows that by closing first the galleries on the side towards which the air from the fire goes, we prevent the danger of explosion by mixing carbonic acid with the air contained between the stopping and the fire, and by throwing the smoke and irrespirable gases back on the fire, we go far towards extinguishing it; it is true it is a matter of great danger and difficulty to build stoppings between a fire and the "returns," but by the use of temporary bratticing and by commencing at a sufficient distance from the fire, it is often practicable, and it is always desirable. Where it is impossible to build the stoppings in this order then, when practicable, it would be advantageous to inject carbonic acid gas, or choke damp, (through a pipe in the stopping) from the moment the latter comes near completion, so that the air contained between the stopping and the fire may not become explosive. We speak, of course, of mines yielding fire damp. Where carbonic acid is not available, it will sometimes be possible to inject steam, which will not only deaden the fire, but will, at least, diminish the intensity of the explosions.

The stoppings completed—and where there is no danger from explosion or need of inundating with water the part on fire, there is no necessity for making them heavy—we proceed to fill the part enclosed with carbonic acid gas, with choke damp, with steam, or with water. In the first case the carbonic acid can be manufactured either pure, or nearly so, by the use of any strong acid, such as sulphuric or muriatic acid and chalk, or limestone, or any of the carbonates of low price and easily decomposed. This gas is easiest prepared in a lead vessel, which is not attacked by the acid. Where the space to be filled is not great, some of the numerous "patent fire-extinguishers might be found of service, as being quickly and easily brought into action. These methods have the advantage of supplying the gas at a low temperature, and thereby facilitating the cooling of the rocks after the flame is extinguished. If the circumstances are such as to make the use of "choke damp,"—that is, a mixture of carbonic acid and nitrogen—advisable, it can be produced in one of the furnaces of which we shall give drawings and particulars in our next article. In either case, as carbonic acid and "choke damp" are both heavier than air, it follows that the tube through which we admit these gases should be at the lowest, and that through which the air from the enclosed space is allowed exit should be at the highest attainable point of the isolated workings, and the admission of the gases should be continued till it is evident they have completely filled these works. This is easily proved by their instantly extinguishing lamps, burning tow, etc., at the outlet tube. The tubes should then be closed, leaving only a syphon or water gauge to mark the difference in pressure between the inside and outside of the stoppings, and a place for the introduction of a thermometer used to note the variations in temperature, so as to know when it will be safe to open the stoppings. The greatest care should be taken to keep the stoppings air-tight; they should be frequently inspected, and where from any reason it is found desirable to "drown-out" or inundate the part on fire, they should have a thickness proportionate to the head of water they will have to retain.

When the fire has assumed greater dimensions, or when its position is such that it becomes dangerous or impossible to confine it by stoppings such as we have described, it becomes necessary to abandon the entire mine and to resort to closing the shafts.

[To be Continued.]

[Since the above was written we have unfortunately had occasion to put some of its teachings into practice, having had one of our mines (the Pine Ridge Shaft) on fire. This was a case of more than usual danger, the mine producing large quantities of fire-damp and the fire being situated in one of the returns on the edge of the shaft, and where the air from the mines must, of necessity pass. By the use of choke damp and steam the shaft was closed without accident, and, doubtless, the fire is now extinguished, but the mine will not be opened till the water has risen above the part on fire; that will probably be in two weeks from the present time (6th September). We shall, in another article, give some further particulars of the fire and of the means taken to extinguish it. Though there was the greatest danger in the Pine Ridge Shaft fire, yet we succeeded in getting all our men out of the mine; not so, however, with another shaft, the Delaware, Lackawanna and Western Railroad Company's Steuben Shaft, near Plymouth, which caught fire this morning from a ventilating furnace, and burned down the shaft-house and "breaker," not a single person being able to get out of the mine. There are at the present moment some two hundred men and boys confined in the mine, and though the fire in the shaft has been extinguished it is not known if the men imprisoned are alive or not. R. P. R.]

Steel.

A PIECE of good steel is an almost priceless treasure, because tools are an indispensible requirement. Yet make steel as carefully as possible, you cannot always rely upon its uniform quality throughout the same piece. Outer indications are often unreliable, and even breakage revelations refer but to the point of structure. In forging steel the secret is the temperature. Too high or too low will ruin all; and this temperature must vary with the kind of steel required. Therefore cheapness should never be sought as the chief good. Blistered and shear steel want more heat than cast steel; the greater the amount of carbon, the lower must be the heat at working, and yet the harder is the labor. Good forging is as important as good material. After cooling, the hammering should be very light, or internal fracture will be set up, not homogeneity. Let the blows fall in one direction; certainly not at right angles to each other other so as to destroy the grain. Burned steel may be brought round by heating hot and quenching in water repeatedly. In tempering, great care is needed. Forging tempers, and a less heat will then suffice. This hammering is better as a commencement, than hardening direct from the annealing oven.—*Architect.*

Metropolitan Railway Communication.

INTER-COMMUNICATION in cities is always a subject of vital, as it is of popular, interest. But, when cities rise up and expand with the amazing rapidity—as instanced in Chicago and New York—there arises a relative demand for a rapid means of passenger and goods transit. New York has been occupied with this question, to a greater or less degree, since the year 1832. The public interest in the subject has now culminated to a point where action must take the place of words. In a consideration of the subject under notice, we must, firstly, assume a demand for travelling accommodation, superior to that offered by ordinary vehicular and passenger plans. Horse railways will assist to relieve the roadway and foot traffic only to a secondary degree, if that traffic be excessive. The mercantile, as also the passenger travelling requirement, is directness, rapidity, and superior accommodation; these advantages are also demanded in all weathers. Taking New York as an example, a superior system to that existing is obviously demanded—the more so, when the prevalence of frosty weather is considered. When the traffic, horse and foot, upon the leading commercial thoroughfare is so dense as to seriously affect commercial and social interests, its partial diversion, together with improved and rapid means of transit, prove an urgent necessity. To meet these emergencies by railway transit, three practical plans suggest themselves: Firstly, a line of railway carried on a viaduct in a direction adjacent to the said thoroughfare whose traffic is to be relieved. Secondly, a mid-air line, or first-story light railway, worked by haulage, or otherwise, and erected over the footways of the thoroughfare itself. Thirdly, an underground railway, to be carried under the thoroughfare to be relieved. An important point presents itself when a system of railway has to be applied to a sea port, where distribution is required from the port to the various termini of the main railway lines. In such a case, it will be apparent that a line of railway should be so arranged that *it would be capable of combination with the gauge, weight, etc., of the ordinary railway systems.*

Of the three practical systems suggested above, the first and last present obvious advantages over that of the mid-air line. In other words, the mid-air line is local in its application, and not a part of a system; whereas, the others each form an integral part of the great railway system. It was this consideration that assisted the abandonment of the idea in London, in which city the metropolitan railways form one vast system of subterranean and viaduct lines, all working in conjunction with the main lines of railway running out of the city. We use the term "underground," not "tunnel" railway, for the former word conveys a more definite meaning. The term "tunnel works" generally signifies a subterranean boring, whereas "underground works," applied to railway construction, may be either tunneled or worked by open cutting afterwards closed in.

Observations on the subject of metropolitan railways are naturally directed to London, the city of their first establishment. But, we fear, that beyond the observation of the fact of their combination of internal with external railway systems, but little beyond detail can be learned from analogy. The progress of a metropolitan railway project through the labyrinths of Legislature, and its commercial success, will greatly depend upon the provisions as to the greater of all difficulties—property. When we consider the immense outlay required for such an undertaking, as to connect the northern or residential quarters of New York with the southern or commercial quarters, what is known as the "Arcade railway project" would be immediately selected by the commercial mind as practical. The Aacade Railway by means of a system of compromise greatly alleviates this difficulty of "property," and also gains directness of route.

Engineering difficulties have been cited as a serious consideration, but such a cry could only be raised by those ignorant of engineering practice. The advancement of the times, and the necessities of commerce, will remove serious obstacles to the introduction of metropolitan railway lines. As before stated, the great difficulty will be capital; this will be forthcoming when a feasible scheme is demonstrated with exactness. In Paris, a system of underground railways was, a few years past, a subject of discussion, but political, more than public reasons occasioned its rejection. The "*Chemin de fer de ceinture,*" a circular railway within the fortifications and around the city, forms but a poor substitute. In London, the Metropolitan Railway Company has achieved an unparalleled success, notwithstanding the extraordinary outlay absorbed. The passengers experience certain inconveniencies from insufficient ventilation, but not to the extent imagined by the alarmists. The locomotives employed condense their steam and consume their smoke. Most of the route is in an enclosed tunnel, which, with but one exception, was all open worked. A portion was carried under old houses, the removal of which was not necessary during the operation. The stations, where they are completely subterranean, are illuminated by daylight, transmitted down spacious openings, with glazed covers, on a level with the footway, and at its sides, resembling cellar plates. The rays of light thus transmitted are reflected into the station by glazed porcelain reflectors. The cars are illuminated by gas, retained in a condensed form in the forward part of the train. To give an idea of the extraordinary result of the establishment of underground railways in London, we may remark that on the principal underground railway line nearly 12,000,000 passengers were carried in half a year. Such a scene of confusion, crowding, and time wasting, as is daily enacted in Broadway, between the City Hall and Bowling Green, should speedily be put a stop to. We entertain the hope that the day is verging on the horizon when our noble port will be furnished with commodious docking, and the distribution therefrom by metropolitan railways will be carried on with order and facility. We consider that both the underground railway systems suggested, are theoretically as they are practically good, but we shall demonstrate the superiority of the Arcade Railway project in a future analytical article upon the subject.

Roads and Railways in Northern India as affected by the Abrading and Transporting Power of Water.

THE following abstract of a paper read before The British Association for the advancement of Science is of quite an interesting character. The writer, Mr. Login, commenced by stating general conclusions he had arrived at, to the effect that the abrading and transporting power of water was increased directly as the velocity and inversely as the depth; also, that when flowing water had once got its proper load of solid matter in suspension, all erosine action ceased. In short, that it was like a balance, the load being always equal to the power, which power, somehow or other, increased as the velocity became greater, and decreased as the depth of a stream increased, Nature always adjusting the load to the various circumstances. He then gave a short description of the plains and rivers of Northern India, and, by the aid of diagrams, went on to argue that rivers flowing through alluvial plains were rising rather than lowering their beds, and, though this silting up process may be very slow, yet it was satisfactory to the engineer to know that the foundations of his bridges would be as safe, if not safer, a hundred years hence, as they are now. In speaking of the changes of the course of rivers, he said that there was more or less a constant cutting going on on the concave banks of a river, with a silting up process on the opposite side. The next subject referred to was the denudation of the high level plains of Northern India called "Doabs" (two waters), and locally known by the name of "Bhanger" land, in contradistinction to the term "Khadir," or low valley lands, through which the large rivers, fed by the melting snows, now meander. Mr. Login said that the higher ridges or "backbones of these Doabs were not caused by any upheavals, but were formed by the denudation of these high-level plains; and, as the rainfall was three or four times as great in the valley of the Ganges as that of the Indus, these backbones in the plains of the Punjab disappeared, as well as all defined drainage lines some fifty miles below the hills, for the simple reason that the water spread over these plains and was absorbed. To this peculiarity in the Punjab particular attention was drawn; for Mr. Logan argued that, if standing crops and grass could permit without receiving injury the rain which fell higher up to flow through rather than over those standing crops, surely the same water could flow *over* an iron rail at very slow velocities, seldom, if ever, rising to such a height as to interfere with a locomotive passing over the line; however, if it did, the obstruction could not last for more than one day in a whole year. By acting on this principle, Mr. Login believed that hundreds of thousands of pounds can be saved in the construction of railways in Upper India, as no embankments or masonry culverts and bridges would be required in crossing such high level plains as the Bechna Doabs, which he had surveyed; while, by pounding back those flood waters by embankments, and forcing it to find an escape through culverts, was most costly and dangerous, for it increased the abrading and transporting power of the water at the very point where alone it could do injury, namely, where it crossed the rail. In support of his arguments he quoted actual occurrences. He urged that deep foundations for bridges was the proper mode for spanning the large rivers of India, and that only one opening for both the main stream and the inundation water should be provided, while any little water that might be left behind in the swamps or low ground which is below the level of the main river should be drained off by what he calls "spoon-mouthed syphons." Speaking of the minor torrents, he briefly referred to another description of bridge, resting on "inverts," with deep, massive curtain walls, which may, with economy, be introduced in some instances; and concluded by stating that once the abrading and transporting power of water was more fully investigated, the engineer could proceed with all descriptions of works affected by flowing water with greater confidence and economy, instancing harbors on the Madras coast, which province, from being at present a financial loss to the State, would soon become profitable, both to India and England, by increased commerce.

On the Utilization of Waste Coal.

A CORRESPONDENT of the *London Mining Journal* offers the following suggestion upon the above topic: He says: "My [suggestion is to use it for agricultural purposes, which can be done at a comparatively small cost, by burning it with the soil, in the manner hereafter stated. It is well known that coal contains much ammonia, and clayey soils great acidity; the ammonia would neutralize the acidity, and render the soil productive; the heat would destroy all the roots and seeds of weeds, and also wire-worms and other noxious insects; thereby less seed would be required when sown. The residuum of the coal and charred soil would disintricate the soil generally, and render it more friable and porous to nourish the seed, so that half-a-bushel of seed would be sufficient for an acre, where now often two and three bushels are sown, with the view to allow for destruction by wire-worms and other insects. The seed saved would pay the expense of labor; and if the waste coal sold at 2s. per ton, would be cheap to the farmer, and a great profit to the mining proprietor, who is now annoyed by its incumbrance. My plan for using the waste coal is to place it in continuous rows, about three yards apart, sufficient to make a fire with a little straw and brushwood; as the fire burns the soil should be carefully thrown on, a little at a time, so as not to extinguish it, the fire to be continued for several days with attention.

"The rows being near each other, the soil could be thrown right and left without further labor than men are capable of without the use of wheelbarrows to remove it. When the fire is all burnt out, the remains should be spread equally, and the land ploughed into bouts or ridges (shapes most approved) with a shallow furrow, separating each ridge or bout with a deep furrow, for drainage, the seed sown, and harrowed in with a light harrow. A crop will follow better than what is obtained by guano, and the land will not require further dressing for three crops, whereas guano serves only for one, and often not that, and is very expensive. The quantity of coal for an acre should not be less than 10 tons—more would be better. Many farmers object to thin sowing, but I have proved it best, having grown wheat, barley, and oats, by dibbling them, some each grain 6 inches apart and others 1 foot; the latter proved the best crop, many seeds yielding 25 to 70 stems and ears each, and so tillered out that the land was covered entirely, and the grain of fine quality. But on stiff soils dibbling is not practicable, particularly in wet weather, therefore I recommend sowing thinly instead, which will be found to answer well, hoping to find that some judicious farmers will try the plan, when I feel sure others will soon adopt it, and ultimately the reduction of waste coal will be effected, and great benefit will accrue to the miner, the farmer, and the country. At a future time I hope to suggest another means of consumption, which will be found beneficial to all classes of society."

Mr. Bessemer on the Lighting of Coal Mines.

THE following letter to the *London Times*, from Mr. Bessemer, so renowned in the province of steel manufacture, is full of suggestions that should arrest the attention of those having coal mines under their control. It runs as follows:

SIR—The frequent recurrence of these deplorable coal mine explosions, and the fearful sacrifice of human life which they entail, call loudly for improvements in the present imperfect system of working these mines; and I doubt not, if scientific men would turn their attention to the subject, that means would be found to render the working of a coal pit as safe from explosions as the ordinary working of a stone quarry. It is true we have the safety-lamp, but its feeble light too frequently induces the miner to open it and use the naked light. What he wants is a more powerful light, and one that he can have no access to, and also a system of ventilation that would bring to the required spot an abundant supply of cool air. I have frequently observed that many of the most urgent requirements of modern arts and manufactures are supplied by simple adaptation of means already known and employed for totally different purposes, so different, in fact, as to present to ordinary minds not the slightest analogy. I will give you an example of this, as it bears strongly on the question of coal mining, and affords, I believe, a means of preventing the possibility of explosion, where gunpowder is not used.

In explanation of this remark, I may mention that I am at the present time busily engaged in investigating the action of combustion under excessive pressure in furnaces where the flame is bottled up (so to speak) like steam in a steam-boiler, by which means the heat is intensified in the ratio of the pressure employed, so that the most refractory substances known to man may be fused or dissipated in vapor with the same quickness and facility with which our most easily fusible substances are melted. In one modification of these furnaces the workmen operate in a large iron room, where the pressure of the atmosphere is greater than it would be at a depth of ten miles below the surface of the earth, and where the temperature, under ordinary circumstances, would be such that no attendant of a Turkish bath could endure it for a single hour. Yet these men and the furnace they tend may, by a simple arrangement of apparatus, be supplied with thousands of cubic feet of air per minute, as cool, or if necessary, much cooler, than the surrounding atmosphere. It may be said that these facts, interesting enough in themselves have no interest for the coal miner; they apparently offer no security to him; he has no need of a source of heat so intense as to liquify the most refractory metals as rapidly as wax melts in a common fire. All this is quite true; but the miner, enclosed all day between black masses of coal above and around him, requires a powerful light to see what he is doing—a light that never fails, that never goes out, that never requires trimming, and, above all, a light that effectually prevents the mixture of air and gas which pervades all coal mines from entering the flame and becoming ignited. Now, these are precisely the conditions obtained by combustion under pressure, which offers to the miner a source of the most brilliant light wholly inaccessible to the inflammable air of the mine. As a simple illustration of the fact, let us suppose a small iron box, a little larger than a policeman's lantern, having a thick plate glass or a bull's-eye on one side of it; in the lower part is a common gas burner, supplied by a pipe from a gasometer above ground; the supply of air to support combustion is arranged in a similar manner, and supplied under pressure from above ground; a small aperture is made in the top of the lantern for the escape of the products of combustion. Now, if the air and gas are supplied to this light under a pressure of, say, 1 lb. per square inch, the light would be brilliant, and the escape from the orifice at this pressure (or even far less) would prevent the possibility of any external gases entering and becoming ignited, In this way every gallery in a mine may be lighted like a workshop, to the great comfort and cheerfulness of those whose whole lives are spent in the cheerless gloom of these dangerous workings. The mode of advancing the light as the work progresses, and its direction by the use of reflectors, and other necessary details of the system, are simple enough, and need not be described.

I only hope, for humanity's sake, that my suggestion may be put in operation by some of our large coal proprietors, as its success would afford me the greatest gratification, for I am convinced that the thorough lighting of a coal pit, and its ventilation so as to insure health and safety to the miners, are purely a question of £ s. d. There is no lack of scientific knowledge or the practical skill necessary for such a purpose, and probably a cost of 3d. per ton on coal would accomplish all that could be desired: and I feel assured that this would be cheerfully paid by every one to secure the miner from these terrible disasters, and ourselves from the moral responsibility and discredit of the present system.

I am, Sir, your obedient servant, H. BESSEMER.

DENMARK HILL, Aug. 10.

MINING SUMMARY.

California.

REPORT ON THE MINES OF THE MARIPOSA ESTATE.

THE magnitude of this property and the prominent position it has occupied before the public for a number of years, makes the following late account of it of considerable interest. Besides its merits as a matter of news, Mr. GOODSELL'S report is valuable as an index of the progress of mining on the Pacific coast:

MARK BRUMAGIM, ESQ., *Trustee Mariposa Estate:*

SIR: On my arrival at the Mariposa Estate, after making an examination of the mills, the several mines now being worked, the extent of water and steam power, tram road and general plan of conducting work by the company, I devoted all my time to explorations and examinations of the mineralogical characteristics, vein phenomena and lithological formation of the larger portion of the auriferous district within the limits of the estate, for the purpose of ascertaining for myself, as nearly as possible, the real mineral value of the company's property. The examination of the main veins on their length, and several of the lesser ones, and all accessable explorations, were sufficient for me to form an approximate estimate of Mariposa as a future gold mining region, and to that extent its value to your company. Extending almost the entire length of the estate is the "Sierra Madre" chain, and nearly parallel thereto on the south is the lesser range of the "Oso" or Bear Mountains, with the valley of the Mariposa several miles in width, lying between. The Sierra Madre originally carried the Main or what is known as the "Mother lode," while on the slopes and in the valleys on both sides, are several nearly parallel veins of varying size and richness. The immense proportions of the "Mother lode" where exposed by desending influences or exploration heretofore made, exceed anything known in the line of auriferous quartz deposits—this being the true contact vein, is assumed to be the original lode, as it lies between the serpentine on the north and argillacious shales, which extend for miles to the southward, resting upon a compact metamorphosed conglomerate. The "Bear Range" lies entirely within the shales and appears to be a secondary upheaval and for a long period, the southern boundary of the water shed of the Sierra Nevadas, at least including the Merced, Tuolumne, and Stanislaus rivers. This range contains a main true-fissure-vein, with a general axial line of auriferous quartz slightly differing in parallelism from the Sierra Madre. Outlying this main one, are several parallel veins and numerous diverging branch veins, less in size but many of them, where denuded or prospected, show at many points remarkable richness. To the present time there appears to have been an entire want of system in surveys and explorations. Prospecting has been confined mainly to those points where the elements had mainly done the work; and where a few adventurers and Mexican miners had commenced explorations. At these points only, has work been done by former owners of the estate, lessees, or the present company. The unequal distribution of gold in quartz deposit renders a thorough exploration along the veins necessary and as neither the Talc or Shales are hard at surface or the debris overlying the veins of great depth, the work can be accomplished at far less expense than would be supposed. There are vast quantities of gold in these veins, but systematic work is necessary to produce it. If any proof is required, I would site the Princeton mine, upon the fissure vein, from which, with imperfect working to a limited extent latterally or downward, yielded within a short time four millions of dollars in bullion. An extension of the Princeton mine westerly, as recently proven, is equally as rich, while the "Green Gulch" mine still farther west, is known to be equally rich. In reviewing what has been done by your company and the present condition of the mines, the Pine Tree mine is first in the series. In recommencing legitimate mining, a very large amount of "dead work" was to be done before any ore could be reached. This consisted of sinking the shafts and drifting for new stopes. Unfortunately the hoisting shaft was started in a poor shoot. Passing to either side better ore was at length reached, extending the main drift eastward through a second shoot of low grade ore; this is now passed, and work is being done at that point for new stopes. Practically the work of the year has been dead work, and the ore furnished the mills such low grade ores as could be procured while working through barren ground. The mine is now in shape to furnish fifty or more tons of ore daily, with but the usual amount of "dead work." The ground is showing as rich below as it was formerly above, in the several chimneys now undercut. I consider this mine as ranking with any quartz mine of the country—it contains an inexhaustible quantity of ore, and only requires prudent management to make good returns. The occasional falling in of caved ground will necessitate the removal of the hoisting engine. Your superintendent suggested a *wire rope*, operated by water at the Benton Mills. I proposed substituting a smaller engine, with air compressor; thereby reserving the power at the mills, which will soon be required for crushing ore. Easterly and above the former, upon the brow of the mountain is located the Josephine mine; upon these two mines just now is your company dependent for ore and bullion. The magnificent outcrop of quartz at surface, the immense thickness of vein, the great width of rich shoots, and their known continuation downward; firm and well defined walls, quality of ore, cheapness of mining and perfect drainage, renders this the best mine of the Sierra on the estate. There are two shafts well opened to the lower tunnel 180 feet below stopes. This mine now is in most excellent shape and there will be no extra dead work hereafter. The ore taken from the mine for a long time has been from the vicinity of hoisting shaft and rather low grade, and highly charged with sulphurets of iron, with some gold. The sulphuret proved refractory and the gold was lost—an improved superheating pipe at the mills will remedy this. Twenty feet west of old shaft, an opening was made into a chimney of excellent ore; easterly between the old and new shafts there is a shoot of good ore, seventy feet wide, while still farther east, at some thirty feet in from main shaft, there is a magnificent shoot exposed on back end and partially below. This chimney is 70 feet in length, from 12 to 20 wide and 180 deep. These several chimneys will furnish an immense quantity of ore, and the supply in the reserves is apparently inexhaustable. The cause of not discovering these shoots was, the English drift, or lower tunnel was made north of the vein, and only intersected it under the new shaft. The future of Josephine promises well; all improved appliances for cheapening work are now in use here. Giant powder, single hand drills, and as many Chinese as can be worked at present. Immediately north of the Josephine vein there is a branch vein called the "Red Stope;" a shaft has been sunk on it 140 feet into settled ground; about 140 tons of $30 ore is now at surface waiting transportation. The ore is delivered at bottom of shafts into the cars, the main and old shafts being used as "mills:" the mine throughout is in splendid condition, and can be worked very economically.

Fifteen miles southeasterly from the Josephine Mine is the Mariposa Mine; at an opening or break in the Sierra the display of quartz on the surface equals anything to be seen in the district; the mine is favorably situated adjoining the village of the same name. But comparatively little work has been done since resuming operations here. The condition of the mine was similar to the Pine Tree and Josephine—all ore removed, and dead work to be done in every direction. To the present time, this has been prosecuted vigorously, and Captain Barnett has a fair opening already made for stoping. Since I inspected the mine a winze has been opened a short distance east of the main shaft into a shoot of very fine ore, showing free granular gold. This is a great improvement on the several ton tests recently made of ore from the stope west of the hoisting shaft. The explorations of the mine are down but 260 feet; before opening the former productive chimneys the shaft should be sunk one level lower, and the tram tunnel driven east to connect with the air shaft now down; this dead work is required before the mine can be considered in proper shape for working. For the extent of ground opened this mine has produced a large amount of bullion; and there appears to be no reason why it may not be again profitable; its characteristics are *narrow rich chimneys* with narrow pinched veins between the shoots. I deem the mine well worth extensive exploring. Several Chinese drillers, fillers, hoisters and barrow men, are successfully working here, while giant powder and hand drills are being tested experimentally. Near the mine is located the finest stamp mill in the State; it has been idle for some time, but is now being overhauled and adapted to the "Eureka" process of working. New drums were delivered, and pullies, shafting, and belting are now on hand. Some 400 feet of trestling, a couple of new tram cars, and other fixtures were being put up, and it was designed to start the mill about the 20th of this month. I shall hereafter speak of the several mines not now in operation. The "Benton Mills" located on the Merced River at the northwestern extremity of the estate, are at present the only power used for reducing ores; they consist of three mills, operated by four improved turbine water wheels with an aggregate of 170 horse-power. The upper mill has been remodelled and is complete in every respect; it has 16 head of stamps with 4 large grinding cylinders, with blowers and hoisting apparatus, and two sets of "Eureka amalgamators" and tables—indeed, it has all the requisite machinery for perfect working by this process, and is in fine working order; it is driven by two turbine wheels of 30 and 44 horse-power.

The new mill is immediately below, favorably located and with entire new machinery. It contains 25 stamps, 3 self-discharging grinding drums, with elevators, pumps, and a double set of Eureka amalgamators, all driven by a new Jonval 66 horse power turbine wheel. The amalgamating cylinder not being conveniently arranged, the mill was idle for some time, but is now working satisfactorily. The lower or old mill has recently been supplied with a new 30 horse power turbine wheel; there are 16 head of stamps, old pattern—single side discharge; it requires no drums, indeed it has no machinery aside from the stamps; it is doing most excellent work, and requires but one filler to tend it and a Chinese to remove the pulp. The Thunderbolt crusher is connected with this mill, and is a marvel in the line of coarse crushing, since the improved gums, introduced by Mr. J. G. Rice, were put in. The Blake crusher is attached to the new mill, and is capable of doing a large business daily, in reducing hard rock. So far as practicable Chinese laborers are employed at coarse work about the mills; but as no dependence can be placed upon them, unless worked in gangs, away from settlements, it is not economical to employ them in other than coarse work. A full organization of mill men must constantly be employed about the Benton Mills, and so soon as it can be done the fourth mill should be put up. Until the Ryerson's Pulverizer has been tested, perhaps it were as well not to be done now, as his mills would require a different plan. There is now a surplus of 60 horse power, beyond that used, when all the machinery is in motion. With one additional turbine of 40 horse power and an eight inch flush board on the dam, you will have a surplus power for most of the year of 180 horse power, or all that will be required for some time. About one year since the old dam on the Merced river was carried away. After much delay and difficulty new timber was procured and the new dam was nearly completed; not being perfectly secured in the centre a flood carried away a large portion of the new structure. This caused further delay and almost an entire suspension of work at the mines. About mid-winter it was rebuilt. So far as I could examine the structure, it appears to be well built and substantially anchored—equal to any flood. Last month the rock sheds, and all available ground near the tramway, were filled with low grade ores, the accumulation of last winter. But one mill pulverizing this ore through June and July certainly would reduce the yield to a very low figure. Since the first of this month better ore will in part at least be crushed, and I presume the yield will be more satisfactory. When the recently mined ores of Josephine and Pine Tree are crushed I see no reason why the 2½ sets of stamps may not give $2,000 per day, and with an additional mill of 60 head, or Ryerson's Mills, with increased force at both mentioned mines, I think the bullion product may be increased to $4,000 per day. The Tram Road from the Benton Mills to the Josephine and Pine Tree Mines is in fair condition. The rails formerly set on edge are now laid flat. Many new ties have recently been laid down, and the old bridge at "Cape Horn" has been removed and an embankment built at that point. The capacity of the road is equal to any production of the two mines. A small force can keep the road in good repair and condition. I trust the time is not far distant when the tram will be laid in a tunnel penetrating the mountain from below Cape Horn, striking the Pine Tree and Josephine veins on that level. In reference to re-opening one or more of the old mines as suggested some time since, I have investigated the subject and have arrived at the conclusion that it would not be prudent to attempt working the Princeton by disturbing the old workings between the Gourget shaft on the east and Phebe on the west. Any work started there should be west from the latter. In the westerly workings of the Princeton there was a wide belt of quite poor ground. Assays from a shaft sunk near the latter point indicate good ore, strong vein and favorable working. There is moreover a branch vein near this point which will I fancy prove as rich as the known branch at the easterly end of the Princeton. The Green Gulch mine has a better record than any small vein mine on the estate, at the time work was suspended. I would, however, prefer to await explorations and start new mines, equalling the Princeton, with all the advantages of work near the surface and a whole thing. The extraordinary rich placer workings are indications to a certain extent of the vicinity of paying lodes. These should be first examined, afterwards general explorations. A shaft sunk some 400 feet west of the Whim Gulch would test a promising locality, or by sinking and drifting west from the Whim shaft would prove if or not there is a continuation of the extremely rich shoot from which so much gold has been taken. There are very many known points in this vicinity that should be explored as soon as practicable. The policy heretofore pursued by owners and lessees of the estate in regard to rewards for discoveries, is painfully remembered by miners and others, and much valuable information has been lost to the present company. You have on the property at Benton Mills—

One	Thunderbolt	Crusher.	
One	Blake	do.	
One	do.	do.	
One	do.	do.	and at Mariposa Mine.
One	do.	do.	
One	do.	do.	not in use.
One	Brodie	do.	

These are all in good order and sufficient for present purposes.

The available power on hand consists of--

Two	30	horse power	Tyler turbine water wheels.
One	44	do. do.	Jonval " " " "
One	36	do. do.	" " " "
Two	40	do. do.	Steam Engines at Mariposa Mill.
One	15	do. do.	" " " " "
One	40	do. do.	" " " Princeton Mill.
Two	10	do. do.	" " " " Mine.
One	35	do. do.	in Mill at Mt. Ophir.
One	20	do. do.	under ground at the Pine Tree.

There is also much valuable machinery connected with the several mills not now used. The Princeton Mill can be removed and used at any other point, with all of its machinery. I did not examine the Mt. Ophir Mill. I made no examination of your plan of introducing water into the Mariposa Valley, but am of the opinion that it is now impracticable. The force employed at the several mines and mills, at the close of July, was as follows, including overseers, mechanics, mill men and laborers:

30 at the Benton Mills, including wood men.
8 on Tram Road, (carpenter, laborers and tram men).
45 at Pine Tree Mine, (two shifts).
15 at Josephine, (one shift).
24 at Mariposa, (two shifts).
8 at " Mill and elsewhere.

Mr. J. G. RICE, Superintendent.

Mr. SUNDELL, Assayer and Superintendent of Machinery, Construction, etc.

The team force is small, merely tram mules and errand horse. Wood costs at present time from six to seven dollars, coin, per cord, with a good stock on hand at the mills, and all paid for. The lumber for the fourth mill is delivered and also paid. The lumber for trestling and repairs at the Mariposa Mine is delivered. The difficulty of introducing Chinese labor consists in their unreliability and the necessity of teaching them the use of tools. Mr. Rice is employing them in such places as they can fill, and will employ them as strikers, wheelers, etc., fast as possible. When once learned they demand equal pay with skilled miners. Until such time as the *placers* are worked out, Chinamen will be of little account as miners. I approve of using all improvements in machinery but prefer that all such be well tested before experimenting with them, to the hindrance of machinery that is doing well. Mr. Rice has tried several experiments at the Benton Mills—some, and have so far proved successful, but each in turn have required time and proportionately have diminished the daily bullion product. I trust there will be no delay with Ryerson's new mill, and further, I hope it will prove a success. If it does as well as in New York, it will soon supersede the Cornish stamps and largely add to your crushing capacity and obviate the construction of more mills.

Your Superintendent has been judicious in the selection of his mining captains; all are good and faithful servants of the company. The financial affairs of the company are well conducted by your efficient agent, whose councils and advice in all matters pertaining to the work is characterized by rare good judgment. The full reports heretofore made on the several mines, and on the Mariposa property generally, leave but little to be said that is new or of special interest, beyond the developments in the explorations made in the several mines now being worked. The discoveries are only important as bearing upon the immediate welfare of the company, and furnishing means for the development of a few of the very many equally good mines that are known on the lines of the enormous quartz veins that traverse the estate.

Had my strength admitted of a more detailed examination and such explorations as I designed to make, I should have been able to do better justice to Mariposa, and give a more favorable exhibit of its intrinsic worth as a gold mining property.

Respectfully submitted,

THOS. GOODSELL, Mining Engineer.

August 10th, 1869.

Pennsylvania.

THE TERRIBLE MINING DISASTER AT PLYMOUTH.

THE daily press of the country has, for several days past, been filled with details of the terrible catastrophe at the Avondale Mine, by which upwards of two hundred souls were hurried into eternity. We take from the N. Y. *Tribune* the following account of the mine and the origin of the fire, as being the fullest and seemingly the most accurate of any that has yet appeared:

HOW AVONDALE IS SITUATED—THE ORIGIN OF THE FIRE—SCENES AT THE SHAFT.

AVONDALE, Luzerne Co. Penn., Sept. 8.—About 168 miles west of New York City is the town of Wilkesbarre, situated in the Wyoming Valley, on the eastern bank of the Susquehanna River. Four miles below, on the western side of the river, is Avondale, and the Avondale coal mine. The Susquehanna is about a mile distant, across the flats. The Lackawanna and Bloomsburg Railroad runs along a high hill, near the mouth of the mine, which is 200 feet up the side of the mountain. Over the entrance to this mine stood a large building, called a "breaker." Here were the hoisting apparatus, the pumping engine, and the machines for breaking and screening the coal as it was taken from the mine. Above, the ground rises at an angle of about 45 degrees. The town of Plymouth lies about a mile and a half to the north. The view of the Valley of the Wyoming is charming. On both sides of the river are groups of mountains stretching away to the north and south, while meadows and gardens slope gently to the water's edge.

On the morning of the 6th of September, about 8 o'clock, some boys, at work in a field near the breaker, saw a bluish vapor rising above the roof, but they thought little of it at the time. An hour afterward, the keeper of the stables in the mine took down some hay for his mules. When near the bottom of the shaft he was heard to cry "Fire," and at the same instant, almost, a column of flame shot up through the ventilator into the engine room. The engineer was driven from his post before he could reverse or stop the engine. In a moment the vast wooden structure, 100 feet in height, and as large as a hotel, was burning in every part. The terrible heat created such a current from the shaft below that nothing could withstand it,

The shaft is 10×16 feet square, and about 350 feet in depth. A partition extended from the top to the bottom, leaving a flue for the air to pass up and down. It was up this wooden box or chimney that the fire first came, and, it being separated from the main shaft, the hostler was thus kept from discovering the fire when he went down.

In order to purify the air in a mine, it is necessary to force the foul vapor out, and in addition to the steam fans used, it is customary to build a fire at the bottom of the shaft for the purpose of getting rid of the "damp." When mines are constantly worked, these fires are not allowed to go out, and no danger is feared, as there is seldom any flame except when the fire is first kindled. The miners in the Wilkesbarre region, having been on a strike for a long time, commenced work on Monday, the 6th inst. The wood fire at the bottom of the shaft, being recently kindled, sent up a blaze before the coal was put on. It is supposed that the wood lining of the shaft caught from the blaze below, though there was many feet of brick work at the bottom.

So soon as the breaker was discovered to be on fire, the fire-engines at Wilkesbarre, Kingston, and Scranton were telegraphed for, and the officers of the railroad informed of the disaster. The alarm spread far and wide, and soon large crowds of people congregated in the vicinity of the burning. The excitement was intense, but when it was rumored that nearly 200 men and boys were beneath the mass of flame, the air was filled with shouts and cries. The engines soon arrived and they commenced playing on the fire. It was like attempting to quench a volcano. No sooner had the fire got fairly under way than the sulphur vapors and gases began to add to the intensity of the heat. Such an awful scene was never before witnessed on this continent. Fresh steamers were constantly arriving from the neighboring towns, and at last there was a perceptible change. And when the heroes of the pumps were victors of the flames, women embraced one another for joy, and strong men rushed up and bore away the heated timbers as though they were straws. No camp-meeting ever sent up as many prayers to God in so short a time before. When the rubbish was cleared away from the shaft, shout after shout resounded through the valley, and a dozen men came forward to attempt a descent into the mine, but even in their haste they were cautious. A dog and lamp were lowered into the black abyss, and the air was found to be good. Again the air was rent with cheers, and again the mothers uttered their prayers. In five minutes preparations were made for a descent. It was about 6 o'clock in the evening when a man was lowered in a bucket. He returned in a few minutes and reported that he found no difficulty in breathing. A thrill of joy ran through the multitude on hearing this, and immediately two men were sent down with tools. They removed the obstructions, and reached the surface at 7 o'clock, nine hours after the first alarm was given. They reported that they had penetrated a gangway 60 or 70 yards, finding three dead mules. They also discovered a gangway door, which they battered so as to be heard above ground. No response was made, and clouds of sulphurous gases came pouring through the apertures. On reaching the top of the shaft, the men fainted, but they were soon recovered. When the people heard of the gas pouring in from the other parts of the mine, they lost all hope. Railroad and mining officials had been arriving all day from up and down the line, and merchants and bankers send word that no money should be lacking.

Later in the evening two men attempted to descend, but the foul air overcame them, and one of them, Mr. Williams, expired. A piteous wail went round, and the operations were suspended until a fan could be geared to drive out the gases. A stationary engine was erected, and soon the powerful fan was forcing great volumes of air into the shaft.

On Monday evening the road to Plymouth and Wilkesbarre was filled with people and vehicles. It was impossible to get near the ruins. Young men, old men, and women of all ages climbed up the sides of the mountain back of the breaker and looked down from above.

It had been reported that there was no fire in the shaft or in the gangways, but it was discovered that the interior was burning with fearful intensity. It seems that the action of the fan revived the dying embers. A stream of water was then turned on and the fire extinguished after it had been burning for a long time.

At dark the scene was a strange one. For many miles up and down this beautiful valley the glare of a thousand lights were seen. The vast quantities of burning coal at the breaker were covered with sheets of colored flame. Great brawny men worked silently and constantly, and often in tears. At intervals a mother's wail came in on the night air, as it did years ago when death once reigned in the Valley of the Wyoming. Long lines of men guarded the hoisting rope on either side, while those at their posts attended to the duties assigned them. The volunteers were lowered by means of a machine worked by horse-power. The hoisting apparatus is located on the elevated plane at the upper side of the breaker, and on the plane below is the mouth of the shaft. Here are lines of miners extending back some distance. When a descent is to be made, word is given to the men above, and the brakes are loosened. The order "Silence!" is given, and a thousand men stand motionless. At last the rope slackens, and then there is another pause, while the foreman looks at his watch. One, two, three minutes are passed, and still the silence continues. Nine minutes! "Up! Up! boys!"—and away goes the horse with a man at his heels on the run. The rope runs slow, and the call for more speed is heard again and again. At last heads appear. "All right!" is heard, a rush is made, and in a minute the new comers fall fainting into the arms of their comrades. The prostrate forms are borne away to the open air, where they are fanned and rubbed until life is restored. It is a sickening sight, but the brave men who have spent their life beneath the ground utter not a word of complaint. The news of "things below" is given in a whisper, sent in shouts to the men above.

All day and all night weary hours passed by, but the workers did not stop a moment. You see a grim creature sitting on a log. His eyes are scarcely visible, and his long, coarse boots, and his canvas suit, close buttoned, make him look as though he had been on a spree for a week. He is an English miner, and he is one of the most experienced in the State. He has come many miles to rescue his brothers, and well does he do his work. I saw him, and wondered when I learned that he had been down the fatal shaft several times, and staid down longer than almost any other person.

The colliery has been running less than two years. The cracker and other buildings were finished in the year 1867. They were built under the supervision of Mr. S. D. Kingsley, and cost $150,000. The Dickson Manufacturing Company put in the machinery. The loss is estimated at $80,000. These works were ranked among the largest and best in the Wyoming Valley. At the time of the fire about 450 tons of coal were daily hoisted from the shaft, although that was by no means its full capacity. During suspension times these works were idle, and had only commenced work on the 2d inst.

The following dispatch from Scranton, received as we go to press, reports a gratifying decrease in the number of dead.

NAMES OF THE VICTIMS.

SCRATON, PA., Sept. 9, 1869.

The following is a full list of the mine disaster at Avondale: Palmer Steele, Dennison Slocum, John Bowen, William Powell, William Williams, Willie Phillips, William Evans, Murray E. Edwards, Jacob E. Mosier, Peter Conlin, John Clark, William J. Evans, George Stackhouse, Edwin Jones, Morgan Watkins, Andrew Frothingham, William Allen, Thomas D. Jones, Peter Johnson, Evan Hughes, inside foreman; Wm. Bowen, James Powell, Thomas Hughes, William Reese, William Porfit, William N. Williams, William Lewis, John Hughes, Thomas Morris, Elijah Bryant, Thomas Roberts, William Dick, Daniel Jones, David Thomas, Daniel Givens, Evans Reese, Edward W. Edwards, Henry Norris, William T. Williams, David S. Reese, Richard Wooley, John R. Davis, David James, William Williams, Richard Owens, Willie Hatton, William Evans, James Powell, Thomas Hatton, Edward Owen, John Burtch, John Burtch, Jr., John Jenkins, William R. Evans, Daniel Wood, William Noss, David Reese, Jr., Griffith Roberts, John Ruth, Joseph Morris, Patrick McGurick, Henry Smith, Shem Howell, Thomas Davis, William Dowdle, John Roberty, Thomas Ryan, Hugh Gilroy, John Maher, Patrick Burke, William T. Morgan, James Murray, Michael Daly, D. P. Pryor, James Phillips, James Williams, John D. Evans, William Harding, Samuel B. Morgan, William R. Evans, William Wildrich, Reese Lumdey, Thomas Llewellyn, Reese Llewellyn, William Davis, John Thomas, John Davis, William T. Williams, William D. Johns, Darius Guyter, William T Reese, William Spick, John Harris, Thomas Jones, Thomas Phillips, Lewis Davis, Charles Frear, John Thomas, David Johnson, James Mallon, James Haskins, William D. Jones, Edward Taylor, Rowland Jones, Madison Allibach, Daniel Edwards, John Powell, William Evans.

The above, 108 in number, were in the mine. Besides these Thomas Williams and David Jones were suffocated Monday evening in attempting to enter the mines.

The figures 202, sent as the number in the mine, were on the authority of Mr. Lee, the outside foreman at Avondale, who shou'd have been the best authority. Various calculations have made the number from 138 to 160. It is certain, however, that 108 is the total number. The explorations have been very thorough and there is no doubt that all have been found. Nobody attempts to account for the great discrepancy between the estimates and the result.

The widows are fifty-nine and the orphans in this country are 109. A number of the men had children living in the old country. The destitution existing is great and requires immediate relief. Three and a half months' strike had reduced all the families to the verge of starvation, the men not being to work long enough to receive any pay. There was never a case that appealed more strongly to the charitable. Funerals have been going on all day. Thirty-seven have been buried at once in the Hyde Park Welsh Cemetery this afternoon. Sixty-one corpses in all have been received in this city. Others have been buried at points down the valley.

It has from the first been hoped that Mr. Evan Hughes, inside foreman, would have made some memoranda which, being found, would give information as to the time life was prolonged, etc. When Mr. Hughes' body was brought up his coat was off, and his tools, time books, etc., were missing. After it was deemed certain that more bodies remained in the mine Mr. Benjamin Hughes, general inside foreman of all the Delaware, Lackawanna, and Western Railroad Company's mines, and brother of Mr. Edward Hughes, taking four men with him, went down to search for his brother's coat, hoping to find it in the memoranda so much desired. He found the coat 500 or 600 yards from where Mr. Hughes' body had been found and outside of both of the barricades. It contained his compass and other tools and two time books, but no memoranda whatever, so all hope of having a record of the last hours of the dead is lost.

Minnesota.

GREY COPPER ORE ON THE NORTH SHORE OF LAKE SUPERIOR.

We take the following from the Duluth *Minnesotian* of recent date: "We mentioned about two months ago, the arrival here of Professor Charles Eames, of New York, who immediately departed down the north shore of Lake Superior intent upon adding his own observations to those of his brothers Henry and Richard Eames, in regard to some peculiar metallurgic discoveries made by them, and partly developed during the previous two or three years; but of the exact value or nature of which the public had been all along kept in the dark. Having, in connection with Mr. Henry Mayhew, long superintendent of their mining operations, still further developed the mineral deposits in question, in a manner to leave no doubt in regard to their importance, and having besides perfected the legal titles to them, beyond any chance of dispute, Prof. C. Eames returned to Duluth the past week, en route for New York, and permits us to indicate fully to the world the extent and nature of the new feature in the mineral wealth of Minnesota and of the Lake Superior region which they have discovered and laid bare.

"This is no less than their discovery of decided and comparatively speaking, very large veins of the article known as Grey Copper ore—a metal very rare, never before discovered in any considerable vein in this country, and which is most valuable for its use as the best known alloy for gold and silver; and particularly for its use in Europe, and especially France, as an alloy for the best jewelry manufactured from the precious metals.

"A specimen of the ore before us, as we write, is in color a pure steel-grey; and the entire vein when submitted to the tests of the metallurgist's manipulations, show it to be singularly pure, without admixture with arsenic, iron or zinc, as is the case with almost all the ore of this metal obtained from the few localities in Europe which afford it in limited quantities. This new developed vein is remarkably large for this kind of metal. It is exposed now for the space of twenty-six feet along its length and varies in that distance from ½ inch to 1½, 2 and 3¾ inches in thickness of grey copper ore; while in other countries half an inch in width is understood to be the extent of the best workable veins.

"The location of the vein now opened is on the north shore of Lake Superior, in Lake County, Minnesota, about ninety miles from Duluth, about forty-seven miles north-east of Beaver Bay, and between Caraboo Point and Cascade River, and at the foot of the high range, known locally as the Saw-Tooth Mountains. The point of mining operations on the Lake Shore to take the ore out of these veins, will probably be known hereafter as Eamesville.

"The original discovery of this vein of Grey Copper ore was made in the summer of 1867 by Prof. Henry Eames, former State Geologist of Minnesota, who was exploring in that direction with Mr. Henry Mayhew. It was first noticed exposed at its thinnest end for about six feet near the water's edge of the Lake, and they first observed it from their canoes in passing, but did not then give it any extended examination. During the year 1868 they returned and took out a few pounds of the ore which they boxed up and sent to New York and Europe, and the examinations and tests in both cases agreeing, and its value having been pronounced unquestionable, led to the expedition here this present summer, of Professor Charles Eames, to complete the title and lay the ground-work for more extensive mining operations on the vein.

"We have said that silver was the only impurity, so to speak, with which the ore was intermingled. Of this metal it contains an amount in value equal to $16 to $18 per ton of every ton of Grey Copper ore. The present work on the vein consists of a shaft into it, which shaft is now down about thirty feet, and it is found as it descends the vein widens in its ramifications. Near the Lake, where it was first exposed for nine or ten feet, at about four feet below water level, it is, with its matrix of carbonate of baryta, quite a foot in thickness.

"At a distance of a mile and a half and two miles further down the North Shore, northeast, there are no less than five other veins of the same metallic ore showing on the Lake shore; which last is there rock-bound, with shelvy rocks of syenitic phorphery. The Eames Company own all these veins.

"The ore produced yields seventy-five per cent. of pure metal and the value of the ore in Europe is about $400 per ton; there being an existing demand for about 3,000 tons, if so much could be procured from the mines the present year."

New York.

DISCOVERY OF BITUMINOUS COAL NEAR BUFFALO.

The Buffalo *Commercial Advertiser*, Sept. 1, has the following account: "Yesterday, some persons who were prospecting on the farm of Mr. John Patterson, at Cowlesville, in the town of Bennington, Wyoming county, discovered an opening from which they took out some specimens of a black substance which they thought looked like coal, smelt like coal, and was coal. Then, pursuing their investigations a little further, they found more of the coal, in larger particles, and, on going still deeper into the opening, became satisfied that they had stumbled upon an extensive vein of bituminous coal. Samples of the coal were brought to this city. We have examined some of the specimens and seen them burn, and, to our unscientific eye and nose, they seem to be pieces of a very superior article of bituminous coal, resembling the famous Cannel coal. The coal burns freely, and we should deem it to be excellent for making gas. Mr. Patterson's farm is situated on a branch of Little Buffalo Creek, about twenty-five miles from this city. Of course he will not be allowed to remain very long in doubt as to whether or no he is the fortunate owner of a coal mine. We understand that parties here have already made arrangements for satisfying themselves of the importance of the discovery. We are informed that there is a gas well near the opening from which the coal was taken, and that two or three houses in the vicinity are lighted with gas from this well."

Michigan.

IRON ORE THROWN OVERBOARD BETWEEN MARQUETTE AND STE. MARIE CANAL.

The Marquette *Plain Dealer*, speaking of vessels engaged in the iron ore trade with the lower lake ports, says: "It is a common practice with certain captains to take on a heavy deck load, and before they reach the canal to dump a dozen or two tons overboard. As the load is paid for in Cleveland or Erie on the bill of freight as made out here, the loss is not discovered. One captain said in speaking about the matter, that 'if he had the ore that is in the lake between here and the canal, he would be worth a million.' The claim of those who practice the dumping game, is that they have to do it to protect themselves, and they say that in every instance where the load has been weighed out in Cleveland or Erie, it has overrun fifteen to fifty tons. Whether this is so or not, and we doubt whether it is, the practice of throwing over a half deck load of ore in order to get even with the shippers is a reprehensible one, and ought to be put a stop to. One captain said that a few trips since he was lying in Whisky Bay waiting for a fair wind, and, happening to get up early one morning, he saw the crew of a dozen vessels that were also wind-bound in the bay, throwing over the better part of their deck loads, and he followed suite. It would seem that the practice is widespread among vessels loading at Marquette, and the owners would be justified in adopting some means to prevent it."

Maryland.

ACTIVITY IN THE CUMBERLAND COAL REGION.

The strike in the Pennsylvania anthracite coal regions has stimulated the mining of semi-bituminous coal in Maryland. An instance, worthy of mention, is the operations of the Virginia Coal and Iron Co., of which we find the following account in the Cumberland *Alleganian* of the 1st instant: "This Company has entered upon the work of opening up and improving its valuable body of coal land, and will soon be prepared to aid in the development of the resources of this region. The Company's property adjoins the coal field in which the Hampshire Mine is located, and is underlaid with the Big Vein, which here increases to seventeen feet in thickness. According to the calculations of experienced coal men, confirmed by the production of proximate mines, it will yield 22,000 tons to the acre. The Company has now at work a force of fifty or sixty men under the general superintendence of John F. Ehlen, Esq., with John M. Standish, Esq., as Chief Engineer, opening up the work, making tram roads, etc., with the expectation of sending coal to market early in November. With this end in view the work is to be pushed vigorously, and if it shall be found necessary the laboring force will be increased to any required extent. The connection of this property with the Baltimore and Ohio Railroad is direct, and as the payment of freight to any intermediate or lateral railroad is thereby avoided, the Company will be able to put the product of its mines into market under most advantageous circumstances, and at figures that will afford a handsome profit."

New Hampshire.

Prof. C. H. Hitchcock, the State geologist, says in regard to the Ammonoosuc gold field in the State, that the legislature of New Hampshire has recently inaugurated an examination of the rocks and minerals of that State in a manner reflecting great credit upon them. During its progress the bounds of the new gold field have been carefully traced out, extending in a narrow belt from Bellows Falls northwardly along the Connecticut River into the dividing ridge between Canada and Maine. The principal New Hampshire gold mine is at Lyman. The vein is fourteen feet, composed chiefly of quartz, containing galena, ankerite and pyrites.

New Dock at Newport.

The foundation stone of the masonry work of the Alexandria Dock, Newport, Monmouthshire, has been laid. Mr. Abernethy, C.E., is the engineer. The dock will be seventeen acres in extent, and will be one of the largest sheets of water in the kingdom. In the event of the necessary capital being subscribed, the dock will be extended to thirty-six acres, the area originally contemplated, but which was subsequently divided into two sections. The company has powers to acquire land to the extent of nearly 600 acres immediately around the dock, and branches to connect the dock with both the broad and narrow-guage railways will be constructed.—*Building News.*

MARKET REVIEW.

The Coal Trade.

NEW YORK, Sept. 9, 1869.

WHOLESALE.—Retailers have come into the market more freely, and there is very little coal left unsold. Customers are beginning to make demands for their winter supply, which in turn stirs the retailer up to keep stock in his yard. Everybody is satisfied now that coal cannot be any lower this fall, and many will find that they have acted wisely in not putting off their purchase of necessary supplies until a later date. To our mind it seems as though—with the difficulties yet existing in the Lehigh and Hazleton districts, and a depletion of our supply by the late disaster at the Avondale mine, which, by a general disarrangement of all operations in that region, for a week, at least, will amount to some 200,000 tons—that there are great chances for an advance in prices. We would, therefore, urge retailers to buy now.

Freights to all seaboard ports are extremely low, which cannot be the case at a later date. In fact every day will tend to advance them. Already we hear, of large advances in the Erie Canal, in some instances amounting to 30 per cent. on last week's quotations. Only a few weeks remain before navigation closes; hence let us get as much of the demand supplied now as possible, so as not to rush the business all in at one time, which must cause prices and freights to advance.

PHILADELPHIA, PA., Sept. 8, 1869.

The market is dull and prices remain unchanged. Schuylkill operators claim to be losing money by the present "basis," and the uncertainty that exists as to what course matters will take there unsettles contracts greatly. A dispatch from Pottsville, received yesterday, says, that "a committee of the Workingmen's Association met here (Pottsville,) to-day, and concluded upon the following: That the wages be fixed for September, on the 25th inst., by one of each of the committee going to Philadelphia, and ascertaining from five dealers the price they were paid for coal during the winter, and to average the same, which average is to be the basis of wages."

Freights have not changed since our last.

The mournful disaster at the Avondale mine, near Scranton, Pa., where two hundred men lost their lives, has cast a gloom over the whole trade, and "Trinity Building" is as quiet as a tomb. The catastrophe is the general topic of conversation in all the coal offices, and heartfelt sympathy is expressed for the unfortunate miners and their bereaved families. A subscription has been started in the trade, which is headed by Samuel Bonnell, Jr., for the relief of the distressed families who have thus been left without support, and we trust the donations to this fund will be generous and ample. These miners' families are in an unusually destitute condition at the present time, in consequence of the long strike. We remarked some few weeks since, at the time of the attack of the city press upon the miner, that he was the poorest-paid of any working man, considering that his life was constantly in peril at his day's labor, and that consumers should, for this reason, if for no other, readily grant him a fair compensation. This argument will now fall more convincingly in consequence of the sad calamity at Avondale. We understand from the Scranton Company that the disaster will not prevent the delivery of the 80,000 of coal sold at the last auction sale. It may, however, interfere with the regularity of forwarding the coal for a few days.

The following table exhibits the quantity of Coal passing over the following routes of transportation to tide-water, for the week ending September 4, 1869, compared with the same time last year:

COMPANIES.	1868. WEEK.	1868. TOTAL.	1869. WEEK.	1869. TOTAL.
Phila. & Reading R.R.	90,302	1,890,002	113,503	2,405,892
Schuylkill Canal	28,497	537,140	4,655	450,949
Lehigh Valley R. R.	50,387	1,584,151	52,798	1,531,537
Lehigh and Sus. R. R.	18,800	291,712	25,000	659,690
Lehigh Canal	35,931	580,337	31,258	477,715
Scranton North	16,274	370,067		265,957
" South	23,535	739,239		577,631
Penn. Coal Co., rail	21,150	610,878	18,272	642,384
" " " canal	949	18,910	598	12,148
Del. and Hudson, rail				103,046
" " canal, north	48,125	1,011,184	14,014	687,281
" " " south				51,174
Shamokin	12,236	325,638	10,591	270,392
Trevorton	1,241	14,917	1,413	18,078
Short Mountain	3,554	69,903	2,766	70,661
Lykens Valley Coal Co.	2,211	58,634	1,961	47,313
Huntingdon & Br'd Top	6,415	165,333	7,137	237,702
Wyoming South	13,718	173,804	12,390	182,314
" North	4,470	35,147	6,778	25,357
Williamstown, Cal'y	3,291	120,115	6,186	135,613
Total	381,176	8,567,111	309,302	8,808,934
1869	309,320			8,567,111
Decrease, week	71,856		Incr yr	241,823

Schuylkill Coal Trade.

Report of coal transported over the Schuylkill Canal for the week ending Thursday, September 2, 1869.

	Tons. Cwt.
From Port Carbon	2,431 05
" Pottsville	
" Schuylkill Haven	2,224 00
" Port Clinton	
Total for week	4,655 05
Previously this year	446,293 14
Total	450,948 19
To same time last year	537,139 15

Report of coal transported over the Philadelphia and Reading Railroad during the week ending Thursday, Sept. 2, 1869.

	Tons. Cwt.
From St. Clair	41,375 10
" Port Carbon	9,508 04
" Pottsville	5,510 15
" Schuylkill Haven	34,482 15
" Auburn	3,806 14
" Port Clinton	15,964 08
" E. P. R. R.	93 03
" Harrisburg and Dauphin	14,511 09
Total paying freight	125,242 18
Coal for Company's use	3,029 13
Total for week	128,272 11
Previously this year	2,661,166 05
Total	2,789,438 16
To same time last year	2,213,482 07

Lehigh Canal Coal Trade.

Shipped for the week Ending September 4, 1869.

WHERE FROM.	WEEK. Tons. Cwt.	TOTAL. Tons. Cwt.
Total Mauch Chunk Region	12,326 04	140,432 16
" Beaver Meadow "	6,849 18	78,326 15
" Mahanoy "		2,254 06
" Hazleton "	1,006 09	111,726 08
" Upper Lehigh "		5,142 07
" Wyoming "	11,066 01	139,792 13
Grand Total	31,253 12	477,715 05
Corresponding week last year	35,931 13	550,337 05
Increase		
Decrease	4,672 01	72,622 00

Report of Coal Transported over Lehigh Valley Railroad

For the week ending September 4, 1869, and previously this season, compared with same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	PREV'LY. Tons. Cwt.	TOTAL. Tons. Cwt.
Total Mahanoy	17,312 06	275,532 10	292,844 16
" Beaver Meadow	18,396 09	277,944 14	269,941 03
" Mauch Chunk		160 15	160 15
" Upper Lehigh		8,581 11	8,581 11
" Hazleton	3,770 19	669,708 16	673,479 15
" Wyoming	14,766 11	289,193 13	303,960 06
Total	54,846 07	1,521,121 19	1,575,968 06
To Lehigh & S. R. R., at P'n. Hav. for rail		4,174 00	4,174 00
Do. for canal	1,006 09	114,051 06	115,057 15
At Mauch Ch'k for canal	6,685 08	75,403 01	82,088 09
Total Anthracite	62,538 04	1,714,750 06	1,777,288 10
Susquehanna Region Bit. Coal (Fall Creek)		552 03	552 03
Total by rail and canal	62,538 04	1,715,302 09	1,777,840 13
Same time last year	68,696 12	1,692,935 02	1,761,631 14
Increase		22,367 07	16,208 19
Decrease	6,158 08		
Forwarded East from M'h Chunk by rail	52,798 11	1,478,763 08	1,531,737 19
Same time last year	50,387 03	1,533,764 02	1,584,151 05
Increase	2,411 08		
Decrease		55,024 14	52,613 06

RECAPITULATION.

Forwarded East from M'h Chunk by rail	52,798 11	1,478,739 08	1,531,537 19
Delivered at M'h Chunk		686 05	686 05
Delivered on line of road above Mauch Chunk	158 02	5,686 00	5,844 02
Delivered above M. Chunk for use of L. V. R. R.	1,789 16	30,622 12	32,412 08
To N. C. R. R., at Mount Carmel		2,516 09	2,516 09
To L. & S. R. R., at P'n Hav., for railroad		4,174 00	4,174 00
Do. for canal	1,006 09	114,051 06	115,057 15
Do. Packerton for rail	99 18	3,423 08	3,523 06
At M Chunk for canal	6,685 08	75,403 01	82,088 09
Total	62,538 04	1,715,302 09	1,777,840 13

Lehigh and Susquehanna Railroad.

Report of Coal Shipped South for the week ending Sept. 4, 1869.

WHERE FROM WYOMING REGION.	WEEK. Tons. Cwt.	TOTAL. Tons. Cwt.
Total Mauch Chunk Region	4,961 18	108,650 00
" Hazleton "	1,230 19	113,123 11
" Upper Lehigh "		77,193 12
" Wyoming "	29,967 06	512,193 13
Grand Total	36,159 17	811,160 16
Corresponding week last year	30,790 07	565,848 16
Increase	5,369 10	245,312 00
Decrease		
Forwarded South from Mauch Chunk	23,502 12	517,721 02
Delivered on line of Lehigh & Sus'na R. R., above Mauch Chunk	962 19	22,124 11
Delivered to Lackawanna & Bloom. R. R. at Plymouth Bridge		14,093 06
Delivered to Lehigh Valley R. R. Co., at Sugar Notch		5,151 03
Delivered at Coal Port, for shipment by Canal	11,694 16	251,470 14
Total	36,159 17	811,160 16

Cumberland Coal Trade.

B. & O. RAILROAD

The shipments over the Baltimore & Ohio Railroad for the week ending Sept. 4, 1869, were as follows:

From Cumberland & Pennsylvania R.R.	Tons.
Consolidation Co	2,946 02
Borden Co,	1,441 11
Balt. & Hampshire Co.	481 07
Midlothian Co.	218 12
Cooke	169 16
From Eckhart R. R.	
C. C. & I. Co.	3,032 15
From George's Creek via Piedmont.	
George's C. C. & I. Company	1,374 05
Maryland "	383 14
Consolidation "	11 04
Central "	2,824 14
Atlantic "	1,972 19
Piedmont "	2,053 06
Swanton "	1,197 10
Potomac "	1,556 11
Barton "	502 12
American "	2,659 03
Franklin "	1,368 07
Hampshire "	2,566 09
Total	19,671 08

BY C. & O. CANAL.

For the week ending Sept. 4, 1869, the shipments by the Chesapeake & Ohio Canal were as follows:

	Tons.
American Co.	3,457 06
Borden Co.	2,682 29
Central Co.	2,709 17
Consolidation Co.	2,076 18
C. C. & I. Co.	2,169 05
George's Creek Co.	754 07
Hamp. & Baltimore Co.	261 12
Midlothian Co.	2,311 00
Maryland	1,807 01
For private parties	725 09
Total for week	19,476 04

Prices of Coal by the Cargo,

[CORRECTED WEEKLY.]

SCHUYLKILL.	AT NEW YORK, Sept. 8. R. A.	W. A.	AT PHILADELPHIA, Sept. 8. R. A.	W. A.
Lump	— —	$8 00	— —	6 50 to 7 00
Steamer	— —	8 00	— —	6 50 to 7 00
Broken	— —	8 00	7 25	6 50 to 7 00
Egg	— —	8 00	7 25	6 50 to 7 00
Stove	— —	8 25	7 25	5 50 to 6 00
Chestnut	— —	7 00	6 50	6 50
Pea	— —	— —	— —	— —
LEHIGH.				
Lump	8 00	— —	7 75	— —
Steamer	8 00	— —	7 75	— —
Broken	7 50	— —	7 75	— —
Egg	7 50	— —	7 75	— —
Stove	7 75	— —	8 00	— —
Chestnut	7 00	— —	7 00	— —
Pea	— —	— —	5 25	— —
SPECIAL COALS.*	R. A.			
Diamond Vein	8 75		— —	— —
New England	"		— —	— —
Locust Dale	W. A.		8 50	— —
Honey Brook, Le'h	"		8 35	— —
Spring Mount	"		8 35	— —
Sugar Creek	"		8 35	— —
Sugar Loaf	"		8 35	— —
Fulton	"		8 35	— —
Stout	"		8 35	— —
Old Comp'y's	"		8 35	— —
Cross Creek	"		8 35	— —
Chauncey	"		— —	— —
Girardville	"		— —	7 00 to 7 50
McMichael	"		— —	7 00 to 7 50
Duncan	"		8 00	— —
Shamokin	"		8 25	7 50 — —
Lykens Valley	"		— —	— —
Broad Top	"		— —	5 25 — —
Hill & Harris	"		— —	7 25 — —
Henry Clay	"		— —	7 25 — —
Powelton	"		— —	6 00 — —
Burnside	R. A.		— —	7 25 — —

*Dealers in these coals may be found in our advertising columns.]

Kittaning Coal Co.'s Phœnix Vein...f.o.b. $5 50
" " Lemon " " 5 25
Cumberland C. & I. Co.'s on board 7 25
Central C. & M. Co.'s " 7 25
Consolidated Coal Co.'s " 7 25

Company Coals.

	L.	Str.	Gra.	Eg.	Sto.	Cst.
Scranton at E. Port	7 00	7 00	7 00	7 50	8 00	7 00
Pittston at Newb'g	— —	— —	— —	— —	— —	— —
Lackawana at Rond't	— —	— —	— —	— —	— —	— —
Wilk'b're at Hoboken	7 25	7 25	7 25	7 35	7 75	7 00

For freights to different points, see "Freights."

Prices for Coal at Mauch Chunk.

	F.L.	Bro.	Gra.	Eg.	Sto.	Cst.
Lehigh	$4 25	$4 50	$4 50	$4 50	$4 75	$4 00
Wilkesbarre	4 25	4 50	5 00	4 50	4 75	4 00

Freight to Elizabethport, $3 21; to New York, $3 36.

Prices of Foreign Coals.

September, 1869.

Duty $1 25 per ton.

Corrected weekly by PARMELE BROS., No 32 Pine street, New York.

Liverpool Gas Caking	$ 9 50@— —
" " Cannel	14 00@— —
" House "	17 50@18 00
" " Orrel	16 00@18 00
Per ton 2240 lbs., ex-ship.	
PRICES FROM YARD.	
Liverpool House Orrel, screened	$16 00@18 00
" " Cannel, "	17 00@20 00
Per ton 2000 lbs., delivered.	

Prices of Gas Coals.

September, 1869.

PROVINCIAL.

Duty, $1 25.	Coarse. Gold.	Slack. Gold.
Block House	$1 75	@— 75
Gowrie	1 75	@— 75
Lingan	1 75	@— 75
Sydney	2 13¾	@1 71½
Pictou	2 13¾	@1 18¾
Little Glace Bay	1 50	@1 00
Caledonia	1 50	@— 75

AMERICAN.

	Coarse. Currency.	Slack. Currency.
Westmoreland Co.	— —	@— —
Despard Coal Co.	$8 50	@8 00
Penn.	— —	@— —
Newburg Orrel Gas	— —	@— —
West Fairmount Gas Coal	— —	@8 00
AT PHILADELPHIA.		
Powelton	$7 50	

Prices at Baltimore—SEPT. 1869.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$8 00@8 60
Pittston and Plymouth	7 75@8 45
Shamokin Red or White Ash	7 75@8 00
Lykens Valley Red Ash	7 75@7 80
Trevorton, Red Ash	7 25@7 50
By retail, per ton of 2240 lbs. delivered	9 00@9 75
Georges Creek & Cumberland f. o. b. at Locust Point for shipping	— —@5 00
West Fairmount Gas f. o. b.	— —@6 50

Prices at Georget'n, D.C., & Alexandria, Va.

September, 1869.

George's Creek and Cumberland f. o. b. for shipping..$4 75

Prices at Havre de Grace, Md.

September, 1869.

Wilkesbarre and other White Ash for cargoes...$7 50@7 75
Lykens Valley — —@7 75
Shamokin Red or White Ash 7 50@8 00
Trevorton and Zebra Valley — —@7 50

Freights.—SEPT. 1869.

TO EASTERN PORTS.	From Philadel'a.	From E. Port and Port Johnson.	From Newburg.	From Rondout.
Stamford	$2 00	$1 00	$1 25	$1 25
Norwalk	2 00	1 00	2 15	— —
Bridgeport	2 00	1 00	1 25	1 25
New Haven	2 00	1 00	1 25	1 25
Hartford	2 75	1 50	— —	1 65
New London	2 00	1 15	1 35	1 35
Norwich (and tow)	2 00	1 15	1 45	1 45
Mystic	2 00	— —	1 40	— —
Stonington	2 00	— —	1 40	1 35
Sag Harbor	2 00	— —	1 40	— —
Bristol	2 00	1 25	1 55	1 60
Newport	2 00	1 25	1 55	1 60
Fall River	2 00	1 25	1 55	1 60
Providence	2 00	1 25	1 60	1 60
Dighton	— —	— —	1 60	— —
Warren	2 00	— —	1 60	— —
Pawtucket	2 00	— —	1 75	1 75
New Bedford	2 00	1 25	— —	1 75
East Cambridge	2 50	— —	2 00	— —
Salem	2 50	1 50	1 85	1 75
Newburyport	2 50	1 50	1 95	1 80
Portsmouth	2 50	1 50	1 90	1 80
Rockport	— —	— —	1 90	— —
Saco	2 75	1 75	1 90	1 75
Portland	2 10	1 40	1 80	— —
Bangor	2 50	— —	1 80	1 80
Bath	2 50	— —	2 00	— —
Middletown	— —	— —	— —	— —
Amesbury	2 70	— —	— —	— —
Boston	2 50	1 40	— —	— —
Cambridgeport	2 50	— —	— —	— —
Taunton	2 50	— —	— —	— —
Derby	2 00	1 15	— —	— —
New York	1 55	60	— —	— —
Hackensack	1 75	— —	— —	— —
Jersey City	1 65	35	— —	— —
TO RIVER PORTS.				
Troy	1 75	95	60	65
Albany	1 75	90	55	50
Coeyman's	1 60	— —	55	50
Stuyvesant	1 60	— —	50	45
Cocksackie	1 60	— —	45	45
Hudson	— —	90	40	50
Catskill	— —	— —	40	35
Poughkeepsie	1 60	75	30	25
Fishkill	1 60	— —	30	30
Cold Spring	1 60	70	30	30
Hawerstraw	— —	50	45	55
Nyack	1 60	50	55	50
Sing Sing	1 60	— —	60	50
Yonkers	— —	40	60	55
New York	1 55	50	70	— —
Saugerties	1 55	— —	35	30
Rhinebeck	1 60	— —	30	35
Rondout	1 60	60	30	25
Tarrtown	1 60	80	60	— —
West Point	1 60	75	30	50

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Schuylkill Haven	$2 50
From Port Carbon, 5 cents per ton more.	
TO ELIZABETHPORT.	
L. V. Railroad from Mauch Chunk to Easton	$1 15
C. R. R., N. J., Easton to Elizabethport	1 81
Shipping expenses at Elizabethport	25
Total	$3 21
TO PORT JOHNSON.	
L. V. R. R.	$1 15
C. R. R., of N. J.	1 80
Shipping expenses	25
Total	$3 20
TO HOBOKEN.	
L. V. R. R.	$1 15
Morris & Essex R. R.	1 80
Shipping expenses	25
Total	$3 20
TO SOUTH AMBOY.	
L. V. R. R.	$1 15
R. & D. R. R.	1 10
Cam. & Am. R. R.	50
Shipping Expenses	25
Total	$3 00

BY CANAL.

Via Schuylkill Canal.

TO PHILADELPHIA.

From Schuylkill Haven	$1 70
" Port Carbon	1 70
" Port Clinton	1 70
TO NEW YORK.	
From Schuylkill Haven	$2 20

Via Lehigh Canal.

TO PHILADELPHIA.

Lehigh Canal	$1 14
Freight and towage	1 15
Total	$2 29
TO NEW YORK.	
Lehigh Canal	$ 71
Morris "	85
Freight	1 70
Towing	10
Total	$3 36

TO JERSEY CITY.

Lehigh Canal	$ 71
Morris "	95
Freight	1 60
	3 26
For re-shipment	30
Total	$3 56

Via Delaware and Raritan Canal.

TO NEW YORK.

Lehigh Canal	$ 71
Delaware Division Canal	43
Delaware and Raritan Canal	57
Freight	1 40
Towage	20
Total	$3 31

TO NEW BRUNSWICK.

Lehigh Canal	$ 71
Delaware Division Canal	43
Delaware and Raritan Canal	47
Freight	1 20
Total	$2 18

For Re-shipment—30 extra for shipping, and 10 cents. drawback.

Foreign and Provincial Freights.

September, 1869.

Foreign.	
Newcastle and Ports on Tyne	£15@£18 keel.
Liverpool	15s. 17s. ton.
TO NEW YORK.	
Provincial.	
Sidney	$3 25
Lingan	3 25
Cow Bay	3 25
Port Caledonia	3 25
Little Glace Bay	3 25
TO BOSTON.	
Sydney	$2 75
Lingan	3 75
Cow Bay	3 25
Port Caledonia	3 00
Little Glace Bay	2 25

Towing Rates.

TO EASTERN PORTS.

	Per Ton.
To New Haven	$ 40
Bridgeport	40
Southport	40
Westport	40
Norwalk	40
Stamford	40
	Per Boat.
Greenwich	$70 00
Port Chester	80 00
Mamaroneck	70 00
Glen Cove	55 00
New Rochelle	55 00
East Chester	60 00
West Chester	30 00
White Stone	30 00
College Point	25 00
West Farms	25 00
Flushing	30 00
Harlem and Mott Haven	20 00
Port Morris	20 00
Ninety-first street and Astoria	16 00

Boats beyond Port Chester, with less than 200 tons, $20 per Boat.

TO RIVER PORTS.

Boats of 150—250 Tons.	Per Ton.
To Manhattanville	9 cents.
Spuyten Duyvil	9 "
Yonkers	10 "
Hastings	12 "
Piermont	15 "
Dobbs' Ferry	15 "
Nyack	16 "
Tarrytown	17 "
Sing Sing	18 "
Croton Landing	19 "
Haverstraw	19 "
Verplanck's	20 "
Peekskill	20 "
West Point	21 "
Cold Spring	21 "
Newburgh	22 "
Poughkeepsie	22 "
Rondout	23 "
Boats of 100 Tons	Per Boat.
To Manhattanville, and Return	$12 00
Spuyten Duvvil, "	14 00
Yonkers, "	15 00
Sing Sing, "	25 00
Peekskill, "	25 00

METALS.

IRON.—Duty: Bars, 1 to 1¼ cents ₱ lb; Railroad, 70 cents ₱ 100 lbs.; Boiler and Plate, 1½ cents ₱ lb; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ₱ lb; Pig, 9 ₱ ton; Polished Sheet, 3 cents ₱ lb.

Pig, Scotch No. 1, ₱ ton	38 —@43 —
Pig, American, No. 1	40 00@41 00
Pig, American, No. 2	38 —@39 —
Pig, American, Forge	36 —@— —
Bar, Refined, English and American	85 —@— —
Bar, Swedes, assorted sizes (gold)	82 50@87 50
	Store Prices.
Bar, Swedes, ord'y sizes, less 5 ₱ ct.	— —@140 —
Bar, Refined " " "	95 —@100 —
Bar, Common " " "	87 50@ 90 —
Scroll " " "	120 —@130 —
Ovals and half-round " " "	120 —@145 —
Band " " "	120 —@— —
Horse Shoe " " "	120 —@— —
Rods, ⅜ to 3-16 inch " " "	100 —@155 —
Hoop " " "	125 —@130 —
Nail rod, less 5 ₱ ct.	— 8¼@— 9¼
Sheet, Russia, as to Nos. (gold)	— 11 @— 12½
Sheet, Single, D. and T. Common	— 5½@— 7
Sheet, Galvanized	List 15@25 ₱ cent, discount.
Rails, English (gold) ₱ ton	— — @56 50
Rails, American, at Works in Pa.	74 00 @76 00

STEEL.—Duty: Bars and ingots, valued at 7 cents ₱ lb or under, 2½ cents; over 7 cents and not above 11, 3 cents ₱ lb; over 11 cents, 2½ cents ₱ lb, and 10 ₱ cent ad val. (Store prices.)

English Cast (2d and 1st quality) ₱ lb	— 18	@— 22
English Spring (2d and 1st quality)	— 9	@— 11½
English Blister (2d and 1st quality)	— 11½	@— 19
English Machinery	— 12½	@— 15
English German (2d and 1st quality)	— 14	@— 16
American Blister "Black Diamond"	— 10½	@— 16
American, Cast, Tool do.	— 19	@— —
American, Spring, do.	— 10	@— 13
American Machinery, do.	— —	@— 13
American German, do.	— 10	@— 13

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper cents ₱ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ₱ lb	— @— 32
Copper Bolts	— @— 33
Copper Braziers, 16oz. and over	33 @— 35
Copper Nails	38 @— 40
Copper, Old Sheathing, &c., clean	20 @— 21
Copper, Chili Pig	— @— —
Copper, American Ingot	22½@— 23
Yellow Metal, New Sheating	— @— 27
Yellow Metal Bolts	— @— 27
Yellow Metal Nails	— @— 27

LEAD.—Duty: Pig, $2 ₱ 100 lbs.; old Lead, 1¼ cents ₱ lb; Pipe and Sheet, 2¼ cents ₱ lb.

Galena, ₱ 100 lbs.	$— @— —
Spanish (gold)	6 32½@6 50
German, do.	6 37½@6 50
English, do.	6 37½@6 87½
Bar (net)	9 00 @— —
Pipe and Sheet (net)	9 20 @— —

TIN.—Duty: Pig, Bars, and Blocks, 15 ₱ cent. ad val.; Plate and Sheets and Terne Plates, 25 ₱ cent. ad val.

	Gold ₱ lb.
Banca	— @38
Straits	— @32¼
English	31½@—

PLATES. Fair to Good Brands.	Gold.	Currency.
I. C. Charcoal, ₱ box	$8 37½@8 62½	$11 75 @12 00
I. C. Coke	7 00 @7 50	9 75 @10 75
Coke Terne	— — @6 00	— — @ 8 50
Charcoal Terne	8 00 @8 25	11 25 @11 75

SPELTER.—Duty: In Pigs, Bars, and Plates, $1 50 ₱ 100 lb.

	Gold.
Plates, Foreign ₱ 100 lbs.	$6 37½@— —
Plates, Domestic ₱ lb.	— 11 @— 12

REMARKS.

IRON.—There has been a little more inquiry for Scotch Pig, but the transactions as yet have been rather light—prices, however, are unchanged. We notice sales of 250 tons of Eglinton, ex ship, at $38; 300 do. Gartsherrie, $41, and 75 do. Glengarnock, $40, from yard. There is no improvement in the demand for American, and prices remain as before noted; we have only to notice sales 600 tons No. 1 Crane, and 100 do. Leh'gh Valley, on private terms. Scrap is in fair request at steady prices;

100 tons old Horse Shoes sold at $49, and 580 do. Wrought at a private price. New English Rails continue in request at previous quotations. American meets with but little inquiry, but prices are unchanged—we quote $74 @ $76 at the works in Pennsylvania. The sales are 4 @ 5000 tons new English at $56.50 gold; 1000 do. old Double-Headed, $49 @ $49.50 currency; and 100 do. Bridge, on private terms. Bar continues in improved demand at the late advance.

COPPER has been quiet, and the sales for the week do not exceed 500,000 at 22¾c. @ 23c. for Lake and Baltimore, and 23¼c. for October delivery. To-day it can be bought at 22½c. for both kinds.

The London market advanced to £69 for Chili Bars.

TIN.—The dealers have bought about 2000 slabs Straits at 31¾c. and 32c., 30 and 60 days. The jobbers ask to-day 32½d. gold; 18 tons English were sold at 31½d gold; Banca nominal 37 @ 38d. The stocks are very small, and the expected amounts from the East Indies also.

The London market advanced 125 for English; Straits is quoted 131s.; Banca in Amsterdam, fl 79.

SPELTER exceedingly dull at 6¾s. for Silesian with a retail business only.

LEAD steady with sales of 300 tons in lots at 6¾c. gold for ordinary foreign.

ZINC.—Dry American, 8½c.; Dry French 10¾c.; Metallic, 12c.; Duty, 2½c. per pound.

MANGANESE.—Pembroke Brand Black Oxide Manganese, Lump, 4½c.; powdered, 5½.

London Weekly Metal Report.

LONDON, E. C., August 27, 1869.

WE have to report great dulness in the Metal Market, with the exception of Chili Bar Copper, which has advanced.

IRON.—We have no improvement to report in either Staffordshire or Welsh Iron, the hot weather in some respects interferes with the manufacture of iron. Scotch Pig Iron, after touching 52s. 7½d. cash, has given way to 52s. 4½d.

COPPER.—Australian and English Copper continues quite neglected and prices nominal, namely, Wallaroo, £77 10s. to £78; Burra, £67 10s.; tough English, £72: best, £74. Chili bars have advanced to £69 cash, and £70 with three months prompt. Ores and regulus, 13s. 6d. to 14s. per unit.

TIN.—Market dull, with sellers of Straits at £131 cash, and from £125 to £129 afloat, according to time of sailing. Banca, £135; Billiton. £131 10s. English tin is steady at about official quotations. Banca in Holland, 79fl.

TIN PLATES are in better demand, and prices about 6d. to 1s. per box dearer.

LEAD.—Market unchanged; good soft English, £19; LB, £19 5s.; WB, £20 10s.

SPELTER.—Business dull, and prices quite nominal. Silesian on the spot, £20 15s. outports; £20 5s. to £20 10s. for common, £20 15s. for specials; V & S, Belgian and Rhenish, £20 10s. to £20 15s.

VON DADELSZEN & NORTH.

Mining Stocks.

SEPTEMBER, 9, 1869.

Among the sales at the Mining Board during the past week we notice Smith & Parmelee at the reduced figures, $2 65@2 70. Business continues inactive in this line and for a day or two past no quotations have been issued by the Stock Board. In Petroleum Stocks we note sales of Buchanan Farm at 45c., and United States at 15c. The following is the last list of quotations that has appeared:

	Bid.	Asked.
Brevoort	$1 50	2 50
Buchanan Farm	40	60
Central	65	70
Clinton Oil	—	—
Home Petroleum	4 00	6 00
Lehigh and Susquehanna Coal	—	—
National	50	2 00
New York and Alleghany	60	75
Northern Light	45	—
Pithole Creek	—	—
Rynd Farm	20	30
Sherman and Barnsdale	—	—
United Petroleum Farms	15	17
United States	70	1 00

The quotations for other stocks will be found in another column.

San Francisco Stock Market.

SAN FRANCISCO, September 8, 1869.

	1st Board.	2d Board.
Savage	52½	53
Crown Point	30	30½
Yellow Jacket	46½	
Kentucky	2 20	2 12½
Cholar Potosi	14	
Gould & Curry	31	
Ophir	17⅞	16½
Alpha	14	
Belcher	17½	
Imperial	46	45
Hale & Norcross	1 24	1 23½

DIVIDEND—Chollar Potosi, $2 coin per share—payable 6th instant.

Cements.

THE cause of the setting of hydraulic cements has as yet not been altogether satisfactorily explained. Whilst Fuchs and Pettenkofer hold that in presence of water, clay and lime form a hydrated silicate, and Pettenkofer ascribes the dead-burning of cement to the production of silicate in the dry way, Winkler and others believe that during the buring of a cement an actual combination takes place, and that the bodies in question set with water, as burnt gypsum does. Winkler believed himself able to assign formulæ to these compounds, but Feichtinger's researches have rendered this improbable. Two contributions to the literature of this subject have recently been published on the Continent by Schulatschenko and by Frémy, and below is given a *précis* of the result of their investigations. The impossibility of isolating the silicates in a cement for investigation led Schulatschenko to choose the synthetical method for his inquiry. He repeated the experiment of Fuchs, of mixing 100 parts of pure silicic acid, obtained from water glass, with 50 parts of lime under water, and found that the mass soon set. Such another mixture was raised to a bright red heat, and, when subsequently treated with water in like manner, also became hard. That a chemical combination had taken place in the latter case was shown by the comportment of pounded quartz with lime. By heating these bodies together a silicate was formed, for from the ignited mass acids separated gelatinous silica. In the second experiment, therefore, the hardening of the cement must be due to the formation of a hydrate. In a third case a similar mixture was heated till it fused, and the powdered product, when placed in water, did not set. From these observations Schulatschenko concludes: (1), that hardening of cement occurs not only when the silicate is produced in the wet way, but likewise when it is formed by the dry method; (2), that Pettenkofer's view, that a silicate formed by the dry way does not set, is not supported by experiment; and (3), that the dead-burning of cements is to be referred to physical causes.—*The Engineer.*

A Cast Iron Tube as a Means of Railway Transit Across the Straits of Dover.

IN the Mechanical Science Section of the British Association, presided over by Mr. C. W. Siemens, F.R.S., Mr. Bateman, engineer, gave an interesting description of a cast-iron tube which he suggested should be laid down for railway pusposes between England and France. He stated that it was the joint design of himself and Monsieur Revy, an engineer of Vienna. The tube would be commenced on one side of the Channel, and would be laid at the bottom of the sea, being built up inside a horizontal cylinder or bell, which would be constantly pushed forward as the building up of the tube proceeded. The line selected for the tube to be thus submerged would be close to Dover on the English side of the Channel, and would extend to Cape Grisnez on the French coast, the distance between the two points being twenty-two miles, and the average depth of water 110 feet. Mr. Bateman stated that the tube would be made large enough for the passage of carriages of ordinary construction, whilst the traffic was proposed to be worked by pneumatic pressure, thus securing a constant supply of pure air, and at the same time precluding the possibility of a collision. He estimated that a slow train would be able to accomplish the distance in one hour and six minutes, but an express would go through with ease in forty-five minutes. Five thousand passengers and 10,000 tons of goods could be conveyed through the tube daily. The estimated cost of the whole project was eight millions sterling, the annual working expenses being put down at £150,000. The discussion revealed the general opinion of the section to be that Mr. Bateman's plan was the best yet proposed. Mr. Bidder, C.E., had some doubt as to the sufficiency of the estimate, but Mr. Bateman was certain it was enough. The works would take five years to accomplish.

Brooklyn Dry Docks

Two very large Dry Docks are now in operation at South Brooklyn. No. 1 is 500 feet long, 60 feet wide at the bottom, and capable of receiving vessels of 12 feet draught at low water, or 18 feet at high water. No. 2 is 447 feet long, and receives vessels drawing 17 feet at low water and 22 feet at high water. By means of a central gate this dock may be divided into two separate parts, each forming an independent dock. The pumping is done by means of a superior horizontal engine of 100 horse power, and two oscillators of fifty and thirty horse-power respectively. The former of these engines connects with a double centrifugal pump, of mammoth proportions, and with a capacity for pumping and discharging forty thousand gallons of water per minute. At this rate, the average time required for completely relieving the docks from water is about 3½ hours; the docks ordinarily contain eight millions of gallons of water. The oscillators are attached to centrifugal pumps used for drainage, or keeping the docks free from water when occupied by vessels. The average capacity is about one thousand gallons each per minute.

Another Anglo-French Telegraph Cable.

THE French Government having expressed their willingness to allow the Submarine Telegraph Company to establish a communication between Brest and England, and employ it exclusively for the transmission of messages to and from America, arrangements are being made between the Submarine Company and the French Atlantic Company for the immediate construction of the proposed line,

MINING COMPANIES AND STOCK QUOTATIONS.

GOLD AND SILVER COMPANIES.	SITUATION OF MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED.
Alameda Silver		A. Queran, 108 Wall st.	$2,000,000	$10 00		80
Ada Elmore	South Boise, Idaho					
American Flag	Nevada District, Col.	P. P. Fullerton, 71 B'way	600,000	10 00	40	
Atlantic and Pacific	Humboldt Co., Nevada.					80
Bates and Baxter	Colorado			50 00	20	75
Benton	Colorado	W. F. Drake, 15 Broad	500,000	5 00	12	15
Briggs	Colorado	J. P. Davies, 19 Cliff	1,000,000	100 00		
Black Hawk	Colorado	C.T.Whittington, 48 Broad	2,500,000	100 00	6 00	
Bobtail	Colorado	J. Stanton, Jr., 25 Nassau	1,000,000		1 00	1 50
Bullion Consolid'ed Gold	Colorado					
Burroughs Gold	Colorado				08	
Church Union Gold	California					
Consolidated Gregory	Colorado				1 95	2 05
Combination Silver	Nevada			100 00	4 50	4 80
Columbia Silver	Austin, Nevada	J. M. Brown, 155 B'way	5 000,000			
Commercial Silver		J. E. Smith, 26 Pine	3,000,000		40	10
Corydon	Gilpin Co., Colorado.	J. Samuels, 40 B'way	500,000			
Downieville	Colorado		2.500,000	25 00	25	35
Eagle Gold	Gold Dirt Dist., Col.	J. P. Davies, 19 Cliff	300,000	1 00	20	35
Empire Gold and Silver	BodieBluff,MonoCo.Cal	H. K. Gates, 70 B'way	1,000,000			
Edgehill		A. Fullerton, 71 B'way	10,000,000			
Esperanza Silver		Ezra Clark, Jr., 13 William	400,000			
Fisk Gold		H. Johnson, 195 Fulton	500,000			
Forest Queen		E. B. Beet, 62 B'way	1,000.000			
Golconda Gold	Sherbrooke, C. E.	H. Adams, 71 Broadway	2,000,000			
Gregory	Colorado		1,250,000			
Gunnell Gold	Colorado	J. H. Rolston, 80 B'way	1,000.000	50 00	4 50	
Gunnell Central	Colorado	C. B. Bostwick, 16 B'way	3,000,000	10 00	80	1 20
Gold Rock		R. M. Lockwood, 93 Wall	400,000			
Great Western Gold		C. B. Bostwick, 16 B'way	200,000			
International Silver		J. W. Brazier, 26 Pine	600,000			
Hope Gold	Colorado		5.000,000			
Holman			2,000,000	25 00	10	20
Kipp & Buell	Colorado		300,000		04	10
Knickerbocker Gold		J. H. Rolston, 80 B'way	200,000	100 00		
La Crosse Gold	Nevada Dist., Col.	P. P. Fullerton, 71 B'way	1.000.000		1	
Lander Hill T. & S.	Nevada	M.L.Catherwood,74 B'way	1.000.000		29	32
Lewis Gold	Georgia		1,000,000			
Liberty Gold					02	04
Manhattan Silver	Nevada	M. L. Ogden	400,000			
Maraposa common	California	Jas. H. Ferdon, 34 Wall	12,000,000			
Mariposa preferred	California	do. do.				13¼
Montana Gold		G. De Cordova	400,000			
Montana M. L. & M. Co.	Montana	A. M. Hoyt, 22 William	250,000			
Montrose	Clear Creek Co., Cal.	W. W. Perkins, 71 B'way	1,000,000			
New York Silver	Nevada	Thos. Sprouil, 78 B'way	1,500,000			
New York and Austin	Nevada	E. R. Siccomb, 70 Wall	500,000			
New York and Owyhee	Owyhee Co., Idaho		1,000,000			
New York and Eldorado		G. H. Munroe, 10 Wall	2,000,000			
N. Y. & Montana M. & D.	Montana	F. A. Chapman, 20 Nassau	1,250,000			
N. Y. & Silver Peach	Nevada	R. C. Root, 74 B'way	2,000,000			
N. Y. & Utah P. & M.		W. H. Mailler, 108 Wall				
Ophir Gold	Comstock Lode, Nev.	L. C. Warner, 70 B'way	625,000			
Owyhee Gold		W. H. Smith, 43 Ex. Place	1,700,000			
Pahranagat Central	Nevada	J. E. Smith, 25 Pine	6,000,000			
Quartz Hill Gold		F. Bernard	2,500,000		1 05	1 15
Reese River Consol'd	Nevada	W. B. Ogden	6,000,000			
Rocky Mountain	Colorado	S. M. Pond, 70 B'way	500,000	10 00	10	15
Rollins Gold		Thos. Bond, 132 B'way	600,000			
Sensenderfer	Colorado	H. A. Shewill, 19 Broad	1,000,000			10 00
Silver Bend		F. W. Macy, 20 Nassau	1,500,000			
Silver Mt. Silver		H. A. Moen, 71 B'way	1,000,000			
Silver Peak & R. M.	Nevada	W. B. Ogden, 52 Wall	5,000,000			
Smith & Parmelee	Colorado	W. H. Hollister, 6 Broad	2,500,000	20 00	2 65	2 70
Social & Steptoe Con.		T. H. O'Connor, 24 Nassau	450,000			
Standard Gold		C. B. Bostwick, 169 B'way	500,000			
Stephenson Silver		A. S. Kellogg, 22 Pine	1,000,000			
Twin River Silver	Nevada	J. F. R. Hadden, 20 Nassau	800,000	100 00	20 00	30 00
Texas Gold	Colorado		500,000	10 00		10
Union Gold	Colorado	F. A. Potts, 110 B'way	1.200.000			
Wash. Mill & Silver	Nevada	W. W. Perkins, 71 B'way	300.000			
Wauba Yuma	Arizona	J. W. Silsby, 36 Pine	6.000.000			

COAL AND IRON COMPANIES.	SITUATION OF MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED.
American Coal Co		M. A. Myers, 119 B'way	$1,500,000	$25 00	45	
Ashburton Coal Co		D. B. Keeler, Jr., 43 Pine	2,500,000			
Block House Coal		H. Robison, 165 B'way	1,000,000			
Brewster Iron		B. Love	150.000			
Broad Top Coal & Iron Co	Pennsylvania	J. A. Simpson, 40 B'way	2,000,000			
Cameron Coal Co		J. Silsby, 36 Pine	2.500.000			
Carbon Hill Coal Co		F. P. White, 111 B'way	1.000.000			
Central Coal		P. H. Riordan, 34 Pine	2.000.000	100 00	35	80
Clifton Iron Co		E. D. Webb, 77 Cedar	1.250.000			
Columbia Iron		J. S. Mackie, 71 B'way	1.000.000			
Consolidation Coal	Maryland	E. Clapp, Prest, 137 B'way	5.000.000			
Crawford Coal		E. Kiscan, 90 B'way	1.000,000			
Cumberland C. & I. Co		W. S. Davison, 11 Broad	5,000,000			
Derby Coal Co		L. Chase, 88 Wall				
Dover Coal and Iron Co			10,000,000	100 00	146½	
Del. & Hudson Canal Co		G.L Stout, Treas. 111 Br'y	500.000			
Ebervale Coal		D. T. Blauvelt, 43 Pine	1.000.000			
Fall River Bituminous		C. H. Jones, 43 Pine	250.000			
Farrar Coal		M. Ellis, 19 William	100,000			
Fisher Iron Co		S. M. Pond, 70 B'way	500,000			
Hamp're & Balt. Coal		C. J. Canda, 52 Wall	1,000,000			
Iron Cliffs Co		G. P. Loyd, 119 B'way	300,000			
Jackson Iron		R. A. Wight, 26 Ex. Place	300,000			
Kemble Coal & I. Co		J. F. Franklin, 112 B'way	100,000			
Keokuk Coal		E. C. Lynde, 52 Wall	1,200,000			
Lackawanna I. & C	Pennsylvania	C. A. Sanborn, 80 B'way	750,000			
Lewis Run C. & I. Co		F. A. Platt, 13 William	800,000			
Lykens Val. Coal Co		J. H. Rolston, 80 B'way	1,500,000			
McKean Co. Bit. Coal Co						
Lehigh & Susquehanna			400,000	100 00		
Mahanoy		C. C. Godwin, 71 B'way	500,000			
McNeal C. & I. Co		G. M. Newton, 42 Cedar	300,000			
Mount Riga Iron		C. H. Ogden, 55 B'way	2,000,000			
New Boston Coal		A. T. Levine, 16 Wall				
N. Y. Con. C. & I. Co		T. Simpson, 111 B'way	150,000			
N. Y. & Lehigh Coal		G. Wrighton, 34 Wall				
Pacific Coal Co		W. Murdock, 7 Nassau				
Peekskill Iron Co		C. H. Mead, 111 B'way	3,200,000	50 00	2 00	
Pennsylvania Coal Co		C. H. Smith, 165 B'way	1,000,000			
Richmond Iron Co		I. N. Soper, 42 B'way	2,500,000			
Scotia Coal Co		C. Runyon, 111 B'way	1.250.000			
Spring Mt. Coal		E. D. Webb, 77 Cedar	600,000			
Springfield & D'p Run C.		G. S. Comstock, 111 B'way	500,000			
Stout Coal Co		E. Potter, 40 B'way	1,000,000			
Susquehanna & Wyoming		I. T. Ludlaw, 71 B'way	250,000			
Tannerdale Coal		M. C. Baker, 117 B'way	420,000			
Wash. Mutual Coal		R. C. Brock, 110 B'way	500,000			
West Point Iron Co		W. H. Tillinghast, 80 B'y	3,400 000			
Wilkesbarre C. & I. Co		E. Potter, 40 B'way	1 000.000			
Wyoming Val. Coal Co						

COPPER AND LEAD COMPANIES.	SITUATION OF MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED.
Anita Copper	California	J. A. Ferguson, 8 Wall				
Corinth Copper	Corinth, Vermont	S. H. Howard, 191 B'way	$500,000	25 00		
Davidson Copper						30
Eagle Harbor Copper	Michigan	W. H. Smith, 43 Ex. Place	500,000	25 00		
Evergreen Bluff Copper	Michigan	F. W. Caper, 44 Ex. Place	500,000	25 00		
Globe Copper		R. K. Rickard, 19 Nassau	200,000			
Grand Portage Copper Co		A. S. Kellogg, 22 Pine	500,000			
Guymard Lead		Samuel Vernor, 38 Pine				
Hilton Copper		W. H. Smith, 43 Ex. Place	500,000			
Hope Copper		J. W. Davis, 19 Nassau	500,000			
Hudson River Copper	New York	T. Clarkson, 22 William	1,500,000			
Indiana Copper Co		J. M. Mills, 25 Nassau	500,000			
Isle Royale Copper	Michigan	F. W. Caper, 44 Ex. Place	1.000,000			
Keweenaw Copper	Michigan	F. W. Caper, 44 Ex. Place	500,000			
Lake Superi'r Silver Lead	Michigan	A. S. Kellogg, 22 Pine	1,000,000			
Omiga Copper	Michigan	S. Cooper, 7 Pine	500,000			
Ridge Copper	Michigan	J. L. Gardiner, Jr., 43 Ex. P	500,000			
Rockland Copper	Michigan	A. Fullerton, 71 B'way	500,000			
St. Joseph Lead	Michigan	J. W. Jones, 6 Broad st.	1,000 000			
St. Marguret Copper		E. P. Sutton, 43 Pine	250,000			
Schoolcraft Copper		R. Walsh, 22 William	500,000			
Superior Copper	Michigan	A. Fullerton, 71 B'way	500,000			
Union Copper		A. S. Kellogg, 22 Pine	500,000			
Vermont Copper	Vermont	J. C. Ely, 191 B'way	500,000			
Wallkill Lead, ass'd		S. M. Pond, 70 B'way			10	

MISCELLANEOUS.	SITUATION OF MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED.
American Zinc Co		W. E. Lawton, 19 Cliff	$1,000,000			
Bigelow Blue Stone Co		H. Bogardus, 14 Pine				
Clough Stone Co		C. P. Williams, 50 Beekman	500,000			
Covill B. L. M. & M'f. Co		C. R. Bostwick, 302 Pearl	250,000			
Manhattan Marble		H. K. Gates, 70 B'way	300,000			
N. Jersey Zinc Co	New Jersey	A. H. Farlin, 61 Maiden L'e.	1,500,000			

THE ENGINEERING AND MINING JOURNAL.

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ROSSITER W. RAYMOND, Ph. D., Editor,

[UNITED STATES MINING COMMISSIONER.]

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The Coal Mine Horror.

THE fearful disaster in the coal mines of Saxony has hardly become a thing of the past—the smoke of the explosion has hardly cleared away—its hecatomb of victims, blackened, bruised, mangled, crushed, and torn limb from limb, are hardly given over to the rites of Christian burial—the moans and cries of its thousand widows and orphans have hardly ceased to be heard, their tears to fall, ere we are horror-struck with the news of a calamity in our very midst, dreadful enough, it must be, in its minute details, almost, to curdle the blood in the heart of the most indifferent of those that seek an opportunity of gazing upon the appalling, the sickening sight. Foreign journals tell us that the cause of the explosion in the Saxon mine cannot be traced as yet to anything reprehensible either on the part of the officers in charge or of the men employed. It would seem that, in some quarters, the idea is entertained that an abnormal state of the atmosphere, induced by an unprecedented amount of hot weather, brought on a gradual filling up with explosive gas of some deep-lying and, for the time, abandoned workings of the mine, and that this gas was accidentally fired on the fatal morning of the explosion. If we accept this explanation as the true one, it remains for us to put in an interrogation or two. Was it not reprehensible on the part of the managers to allow the old workings to go, day after day, and perhaps week after week, without inspection, affording thereby an opportunity for the death-dealing gases to collect within their chambers? It seems to us that such neglect was culpable to the last degree. If not touching the live coal to the powder, it was, in effect at least, the preparing of a magazine for others. Again, why were the miners allowed to use the open lamp, so that in case of an accidental collection of fire-damp, the way to an explosion would be unerring, sure? True, the mine was one in which explosive gases have given little or no trouble for years past, if ever before. An old miner—an overseer—who only two years ago was our guide through this identical mine, in reply to our inquiry if it was not dangerous to use an open lamp, remarked that they were never troubled with fire-damp. He had spent forty years in those mines; so he told us. How little did he dream then, that in two years more he would meet death at the hands of what he now seemed least to fear! With a proper inspection of the abandoned galleries, and, as a further safeguard, the use of the safety-lamp, it appears there would have been no explosion in the coal mines of Saxony. But how is it in case of this American counterpart, in so far, at least, as death is concerned? How is it in regard to the two hundred victims of the Steuben mine, whose blackened bodies, even at the moment we are writing these lines, are being brought out of the smoking, fiery pit, wherein they were choked to death? What was the cause of this slaughter? Who—if there are any culpable ones, and that, there must be—who, we repeat, are responsible for the widowhood and orphanage of a thousand or more of helpless human beings? If report be true, one does not have to seek long for an answer to these questions. We are informed that the galleries wherein these men worked, wherein they were imprisoned, and wherein, grouped together, they died the horrid death of suffocation by means of carbonic acid gas—we are informed, we repeat, that these galleries were provided with *only one shaft!* A mine where hundreds of men were constantly working, hundreds of feet beneath the surface of the ground with only *one means of egress*, and that, the shaft used alike for hauling out the coal, for taking in the timber for supports, for ventilation and drainage—its parallel, we hope, can be found nowhere upon the face of the globe! Certainly such a state of affairs as regards mine-management is a contradiction in terms to the very first principles of the art of mining, as indeed, also, to one's common sense. It is more likely, however, that the opportunity for this tragic event was brought on, not so much from lack of proper knowledge or want of common sense, as from what is more reprehensible still—to wit, recklessness, a total disregard of the value of human life, a greed for gain with no thought or care as regards the welfare or peril of others in satisfying it.

But the question now arises whether the existing state of affairs as regards the irresponsibility of mine owners is to be allowed to go on, and that, indefinitely. Are owners still to be left to carry out their own plans—neither economical nor humane—in the management of their mines? It seems to us the time is ripe for swift action on the part of the Government. The strong arm of governmental interference should be brought to bear in regard to matters that involve the lives of thousands upon thousands of its citizens. Thereby, the dangers that ever attend the steps of the miner would be lessened to as great a degree as possible. Selfishness would no longer be allowed to have its own way, with its sacrifices of human lives in a moment of time. It is to be hoped that the coal interests of the State of Pennsylvania are large enough to warrant a litle legislation on her part, in behalf of the lives of the thousands that constitute her mining population—in behalf, moreover, of the mine owner himself; for it is clear that a proper system of inspection at the hands of scientific and trustworthy men would conduce largely to more economical methods of working. But there is no recalling the past. The dead of Avondale cannot be given back to life. See to it, then, ye in whom is vested the power—see to it, that with the widening and deepening of our coal-mine workings, there shall be a supervision so intelligent, so faithful, as to render impossible a repetition of the tragic scenes now being enacted in that little coal hamlet among the mountains.

New and, it is to be Hoped, Important Discovery.

THERE is now on exhibition in this city some specimens of iron and steel, manufactured by a new process, that exceed anything we have before seen. Every article made from this new metal is of superior excellence. Files and razors of a degree of excellence equal at least, if not superior to anything we have before seen, are made of this metal. It is gratifying too to know that the discovery is an American one, and as such we doubt not will soon find abundance of the needful to make it a success. It would seem that the quality and cheapness of the metal would at once secure its success. Superior British iron sells here at twenty-one cents a pound. It is claimed that our common pig iron can be treated by this new process and made to equal the best British and Swedish, at the trifling expense of seventy-five cents or one dollar per ton. The process is so simple and cheap that it may be applied not only to the better kinds of metal, but even to common castings, thereby increasing their strength at least *five* times. There are many advantages in working this new precess, such as a very tenacious metal, and one which is uniform, and does not adhere to the bottom of the furnace, and on account of its uniformity and tenacity can be run from the furnace with a saving of a great portion of the present waste of running. We congratulate the discoverer, for he who improves iron adds to the comfort of every individual in the land. The future of this discovery seems especially bright, and it will be well for iron manufacturers to give it a share of their attention.

The Telegraphs.

IT is rumored, and we believe with truth, says the London *Globe*, that when Government has taken over the administration of the telegraphs, the repairs, maintenance, and construction of telegraph lines will not be intrusted to any commercial company. The Govern ment, it is said, will employ for this purpose non-commissioned officers and men of the Royal Engineers. Thus, not only will the work be more cheaply performed than by civilian labor, but a valuable corps of efficient constructors of telegraphs will be formed, which will be of the utmost service in any future campaign, to lay and maintain those field telegraphs which must in future be essential concomitants of every combatant force in active service.

The Air-Line Railway to Boston.

IT would seem that, at last, it is a settled fact that we are to have an air-line railway to Boston. The matter, like most other important ones, has had its day as regards agitation, discussion, opposition; but now the real work has begun. A large portion of the road is, we learn, already under contract, and the work rapidly progressing. It is said that in the early Spring the route will be open for public travel from Middletown to New Haven. When completed, the distance from New York to Boston will be shortened about twenty-eight miles. This shortening of distance will give, at the present average speed of Express trains, a saving in time of about an hour in making the journey between the two cities.

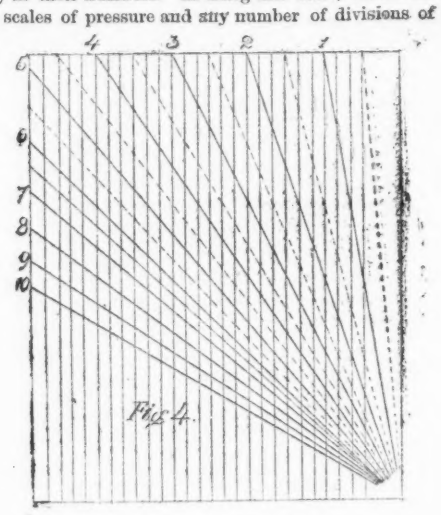
On Computing and Comparing Indicator Diagrams.

BY G. H. BABCOCK.

Read before the Polytechnic Society of the American Institute, April 29, 1869.

WE now have two diagrams tangent at two points—the exhaust and compression—the one always larger, and enclosing the other. The inner one represents what the steam actually performed in the engine, the outer one what the same amount of steam should have done in a perfect engine of the same capacity; and the proportion which the area of the smaller bears to the larger gives a very good idea of the relative perfection of the mechanism which was used for developing the power of the steam. This may be expressed in percentage of the theoretical, and a collection of diagrams so figured, the arrangement of valve gear in each case being fully noted, is very instructive.

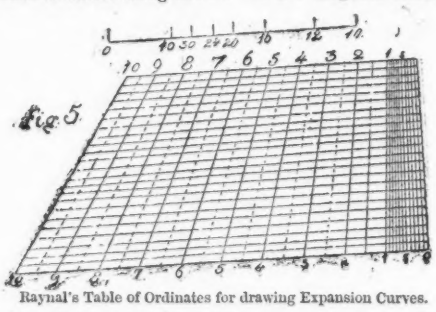
To facilitate the construction of these theoretical diagrams, Mr. A. H. Raynal has devised the scales shown in FIGS. 4 and 5.* FIG. 4 is for laying off the hyperbolic curve of expansion with rapidity, and without the mental effort incidental to mathematical calculations. It is simply a series of secants numbered from the vertical, whose tangents are to each other inversely as their numbers. In using this scale, which answers for all scales of pressure and any number of divisions of the



Raynal's Table of Tangents for drawing Expansion Curves.

diagram, we take the terminal pressure in the dividers, or on a slip of paper, and find with which of the vertical lines it corresponds, at the secant, corresponding with the number of parts into which the diagram is divided; and each of the other pressures will be found at the intersection of its corresponding secant with the same vertical line, and may be transferred directly to the divisions of the diagram. Should the number of divisions exceed ten, the dotted secants are used. They also serve for semi-divisions, of the diagram, where accuracy requires them, as when the point of cut-off is quite early in the stroke. It is not essential to determine the terminal pressure in all cases, but frequently it will be sufficient to take the pressure at the 9th or any convenient division, and from that point lay off the curve each way.

FIG. 5 is a device for laying off the divisions of the diagram, including clearance, the length of diagram, and percentage of clearance to stroke being known. It is a diagonal scale, with



Raynal's Table of Ordinates for drawing Expansion Curves.

one of the divisions subdivided in a progressive ratio. In using it, the length of the indicator diagram is taken on a slip of paper, and so placed upon the scale that, while horizontal, one end rests upon the subdivision which represents the percentage of clearance, while the other end is at the extreme line of the scale; the several principal divisions of the scale are then marked on the slip of paper, the distance of the exterior line from the percentage subdivision mark being the clearance in the same scale as the stroke. Where the length, including clearance, is given, this scale is used simply as a proportional scale of parts. With this scale is given a scale of 14.7 lb in various scales of pressure, a very convenient adjunct for laying down the line of no pressure, or perfect vacuum.

Let us now consider briefly the effect of condensation and leakage of the piston or exhaust valves, and whether these so modify the results obtained by this mode of comparison as to render it of little value.

Of course any cause which lowers the terminal pressure will decrease the size of the theoretical diagram in any given case, and thus give the engine a higher than its proper rate. Leakage from the cylinder produces this effect, and when this exists to any considerable extent, the diagrams are worthless for any other purpose than as a measure of power. As the amount of such leakage is not measurable upon the diagram, it is important, when diagrams are taken for the above investigation, or in fact for any purpose, that this point should be determined. This may be done by blocking the engine upon either half stroke, and letting on a full head of steam. By then examining the exhaust, the leakage, if any, will be detected, and may be measured by causing it to be condensed in cold water,

weighing the water both before and after a given time, or by noting the rise in temperature of a given weight of water.

But the question of re-evaporation of condensed water within the cylinder while the exhaust valve is open, is not so easily determined. It may be and has been measured by using a surface condenser, weighing the water discharged therefrom, and comparing it with the weight of steam exhausted, as determined by the capacity of the cylinder and passages, and the specific weight of steam at the terminal pressure, and has been found to vary from 9 to 50 per cent. of the whole amount of steam used, according as means for its prevention have been used or neglected. This loss, if measured and accounted for in the theoretical diagram, would reduce the apparent rate of the engine; but as it is nearly the same in all cases having the same amount of protection to the cylinder, and is in a measure independent of the mechanism of the engine, we may ignore it in the foregoing calculation, without seriously affecting the value of the latter as a means of comparing the efficiency of one engine with another. But we should bear in mind in such comparison that the effect of this practically unavoidable loss is, in all cases, to belittle the performance of an engine having a good degree of expansion within the cylinder when compared with one having little or none, because in the former a portion of the re-evaporation occurs during expansion, and enters into our calculation. We should also remember that when a steam jacket is employed, its usefulness is not fully apparent in this mode of comparison; for the principal benefit of the steam jacket being to lessen the loss by condensation, and to increase the proportionate reëvaporation during expansion saving in condensation is not represented while the increase of reëvaporation during expansion raises the terminal pressure, and thus lowers the percentage of the indicated diagram.

It will be seen that in this mode of comparing the performance of engines, the questions of the relative economy of expansion or non-expansion, of high or low pressure, condensing or non-condensing, are not mooted; the comparison merely being as to the relative value of the mechanical arrangement for utilizing the steam used, at the particular pressure and degree of expansion, and under the circumstances which are employed in the engine. But it clearly shows why an engine which admits the steam at or near boiler pressure, and automatically cuts it off at a point in the stroke proportionate to the load, is more economical than one which has a fixed or no cut-off, and a variable load, the power and speed being regulated by a throttle valve. It also shows graphically the benefit of large pipes and passages, a tight, quick-moving valve, and of a proper amount of compression.

This mode of expressing the value of mechanical arrangements in steam engineering was first published, it is believed, in a pamphlet issued by the firm of which the writer is a member, about a year ago. As it was not practicable in the limits of an advertising pamphlet to fully elucidate the grounds upon which the comparison was based, and because many even among the profession do not seem to understand the mode of delineating the theoretical diagram, I have taken the present occasion to enter into a more explicit description and explanation of what I believe to be a new and interesting investigation.

In the foregoing I have assumed that steam expands according to Marriotte's law, for the reason that were it a perfect gas, instead of vapor, it would follow that law in its expansion, and it is not improper, for the purpose of comparison, to so consider it; while that law admits of a ready construction of the theoretical diagram without the necessity of tables or pressures or the use of logarithms. But should any one prefer to use the modified law of expansion of steam deduced from the experiments of Regnault, the Franklin Institute, and others, it can be done by employing the tables of pressures and volumes given in most collections of engineering formulae. To facilitate this, I have constructed the scale shown in Fig. 6, which is a series of expansion curves, as per such tables, laid down to different scales of pressures. The terminal pressure having been ascertained, the same is found in the curve having the same scale of pressure as the indicator diagram. The distance between that point in the curve and the line of no volume is then divided into as many divisions as there are in the diagram, and at each division will be found its corresponding pressure.

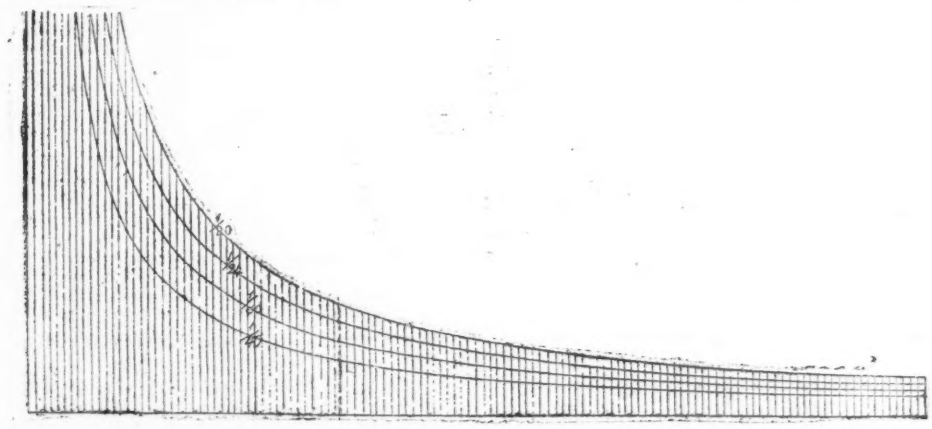


Fig. 6. Regnault's Expansion-curves in various Scales. 20—24—30 and 40 lbs. to the inch.

This curve may be also described by first finding the ordinates of a hyperbolic curve, based on a terminal pressure equal to the 0.941 power of the true terminal pressure, and then extracting the 0.941 root of each of these ordinates.

The curve thus formed is always exterior to that derived from Mariotte's law, as is seen in Fig. 7, which is a diagram fully developed in accordance with* the foregoing directions, and with both curves of expansion delineated.

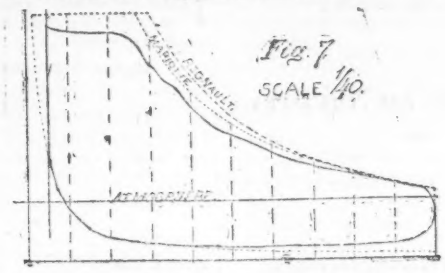
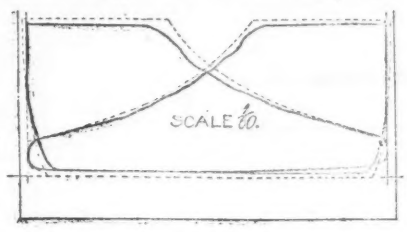
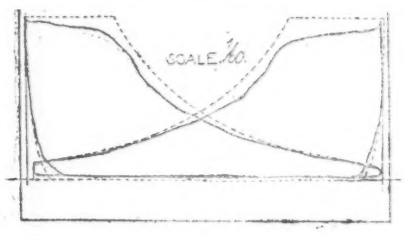


Diagram with theoretical Expansion Curves according to Mariotte and Regnault.

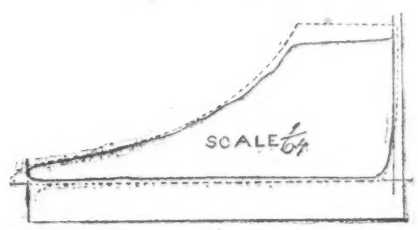
Several diagrams from various engines, compared in the foregoing manner, are appended to illustrate the principle.



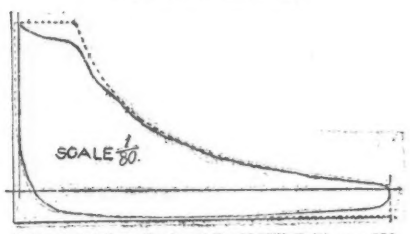
Babcock & Wilcox Engine at Atlantic Mill, Milwaukee, Wis.
Dia. of Cyl. 26 ins.—Stroke 4 feet—60 revol.—264 Horsepower.
92 per cent. of theoretical.



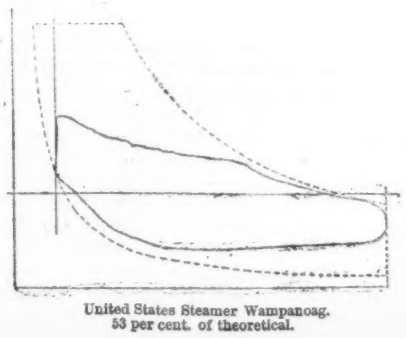
Babcock & Wilcox Engine at Kings County Flour Mill, Brooklyn, E. D.
Dia. of Cyl. 22 ins.—stroke 42 ins.—70 revol.—143 horsepower.
89 per cent. of theoretical.



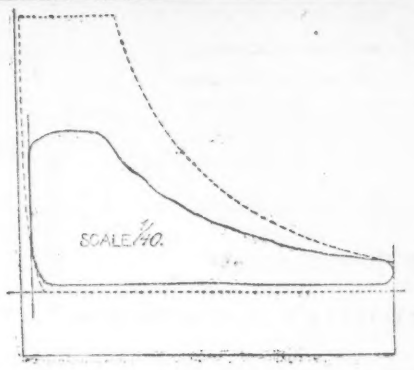
Babcock & Wilcox Engine at Roger Williams' Mill, Providence, R. I.
Dia. of Cyl. 14 ins.—stroke 4 feet—60 revol.—62.4 horsepower.
90 per cent. of theoretical.



Babcock & Wilcox Engine at Druid Mill, Baltimore, Md.
Dia. of Cyl. 28 ins.—stroke 72 ins —46.8 revol.—460 horsepower,
91 per cent. of theoretical.



United States Steamer Wampanoag.
53 per cent. of theoretical.



Repair-shop of the Chicago & North Western R. R.
Cyl. 15 ins.—Dia. 35 ins. stroke—26 revol.—15 horsepower.
54 per cent. of theoretical.

* These scales, accurately prepared and of the proper size for common Indicator Cards may be obtained by addressing A. H. Raynal, 44 Cortlandt street, New York.

Overland from California to Oregon.

I HAVE no time, in these lines, hastily penned *en route*, to do more than urge upon the traveller who cares more for seeing the interior of a beautiful country than he does for a little bodily ease, to go from San Francisco to Portland overland, in preference to the route by the coast steamers. The trip occupies about six days and a half, travelling almost constantly day and night; but, by allowing a little more time, and stopping over a day at several places on the road—for instance, at Oroville, Shasta, Yreka, Jacksonville, and Eugene City—the fatigue or the journey may be diminished, and its pleasure and profit sensibly augmented. The road traversed by the stages of the California and Oregon company leads from the terminus of the California Northern Railroad at Oroville, through Cuba, Trinity, Shasta and Siskiyou counties, into Oregon. The first part of the journey is in the northern portion of the great central plain of California, and affords a good opportunity to observe the immense scale upon which agriculture is carried on in this State. At Chico, we passed the magnificent ranch of Governor Bidwell, comprising (I am told) at least 100,000 acres, and stretching along on both sides of the road for some ten miles. Governor Bidwell is said to have 9,000 acres of wheat in one field.

Proceeding northward, we soon come into the mountainous district, where the Sierra and the coast range draw closer together, and interlock their spurs. Their main continuation northward is the Cascade range of Oregon. Trinity, Shasta, and Siskiyon counties are all important for placer mining, though not yet included in any official reports to the Government. This omission will be remedied in the next report of the present Commissioner.

Near Yreka, the road passes within thirty miles of the far-famed Mount Shasta, or Shasta Butte, as the people call it. Lifting its snowy crown proudly into the clear blue, visible from afar—no, I can't quite consent to "embellish" so far as that. In sober fact, many miles of mountains to the northward being on fire, the air was filled with smoke; and I went within thirty miles of Shasta without seeing it. My vexation was somewhat abated when, last night, after crossing the Oregon line, we passed a portion of the burning forests. Anybody can see Shasta at any time; but if the woods are allowed to get afire a few more times, as they are now in Washington and Oregon, a burning forest will become a thing of the past. So I enjoyed the splendid spectacle with a due sense of its perishable nature. Much is said, but more should be done, with regard to the great loss of valuable timber from these fires. I have an article a brewing on that theme.

JACKSONVILLE, OREGON, August 2, 1869. R. W. R.

How to Make Paper Transparent.

ARTISTS, architects, land surveyors, and all who have occasion to make use of tracing-paper in their professional duties will be glad to know that any paper capable of the transfer of a drawing in ordinary ink, pencil, or water-colors, and that even a stout drawing-paper can be made as transparent as the thin yellowish paper at present used for tracing purposes. The liquid used is benzine. If the paper is damped with pure and fresh-distilled benzine it at once assumes a transparency, and permits of the tracing being made, and of ink or water-colors beinfi used on its surface without any "running." The paper resumes its opacity as the benzine evaporates, and if the drawing is not then completed, the requisite portion of the paper must be again damped with the benzine. The transparent calico, on which indestructible tracings can be made, was a most valuable invention, and this new discovery of the properties of benzine will prove of further service to many branches of the art profession. in allowing the use of stiff paper where formerly only a slight tissue could be used.

Mining Machinery for Japan.

A SAN FRANCISCO foundry has recently shipped a ten-stamp mill, with amalgamating appliances complete, on an order to Japan. The *Mining Press* says that the motive power will be a large overshot-wheel, which the Japanese are building themselves at the mine. The process to be employed is a dry one. The ore, after leaving the batteries, will be further reduced in amalgamating barrels, of which five are furnished, weighing 1,175 pounds each. The battery is a most substantial one, with iron columns and head-pieces, iron being used everywhere so far as practicable. The machinery was all set up and proved before being shipped. The two batteries, of five stamps each, weigh about 10 tons. The weight of the entire shipment is abont 35 tons.

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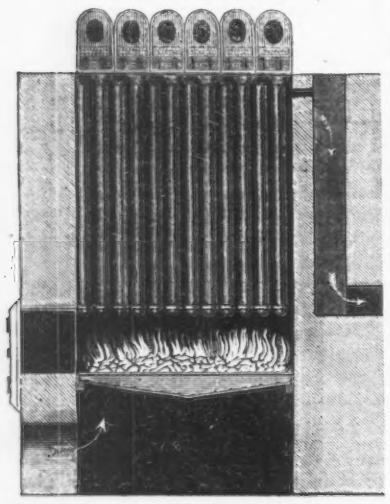

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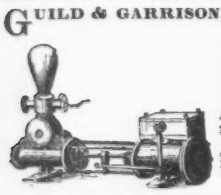

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" Splitting of (plans)
" One current of (plans)
" One current of, and how to adopt separate currents (plan)
" Dividing of, but not into "separate and and distinct" current (plans)
" Crossings (see H on plans)
" Weight of in shafts
" How to find the weight of
" Table of pressure in shafts
" Expansion of
" Its velocity and force
" Rush of, into each division
" Quantity produced by natural ventilation
" Splitting, why it should be adopted
" Splitting, why the workmen object to Mr. Hopton adopting the mode
Anemometer, measurement of air by, engraving of
Area of a pit, how to find
Barometers, Showing the time of an outlet of gas in mines (engraving)
Bricks, how to find the number in the walling of a shaft.
Buddle's plan
Circumference of a pit, how to find
Coal, several ways of working it out, and why man methods of working it out are adopted
" Working out in banks (plans)
" Working it out in following up banks (plan)
" Working out in pillars (plans)
" Working out in long wall (plans)
" Working out in drifts (plans)
" Working out with no regularity (plan)
" Working out by the "end way" or in endings (plan)
Cubical Contents of a pit, how to find
Dialing, the mode of
Dials, several engravings
" How constructed
" How fixed in mine surveying
" Needle, its variations
Diameter of shaft
Dip of mine, how to find and lay on (plan)
Explosion, the power of an
" At Lund-hill, in what part of the mine it was supposed to take place (plan)
" How the power may be diminished
Furnace, how to find the horse-power of
" The place of fixing, to produce the largest ventilating current
" Engravings of ground floor, front and back view
" Remarks upon
Gases, (carbonic acid) composition of
" Do. properties of
" (After, or choke damp) composition of
" (Carburetted hydrogen) do.
" Choke damp and carbonic acid, not one and the same in qualitty
" The effect produced on people by inhaling such
" The quantity required for an explosive mixture
" The elasticity of
" The weight of
" The nature and quality of
" Why some mines generate and produce more than others
" Why some mines generate a mixture of
Goaf, or gob, how tramrods are made through (plan)
Lund-hill (plan)
Managers, who are best competent to manage mines
Miscellaneous questions
Natural ventilation
Planning, how workings are laid on the plan
Regulations (see R on plans)
Safety Lamps, why flame will not penetrate through, engraving of
Sections on mechanical ventilation
Summary of accidents
Surveying, how mines are with the dial
Surveying, how mines are with the theodolite
Tables of weights and measures
Temperature on surface
Temperature in mines
Temperature, difference of between down and up-cast
Theodolites for mine surveying
Theodolites, how constructed
Theodolites, the magnetic needle dispensed with, and how workings are laid on plan, with Theodolite surveying
Theodolites, how mines are surveyed with them
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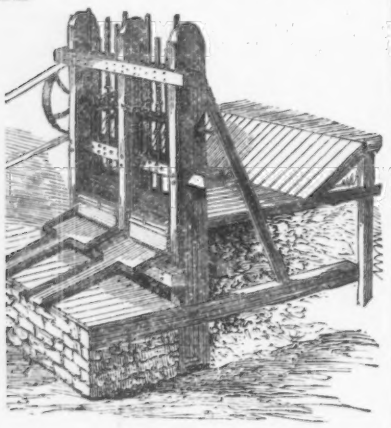

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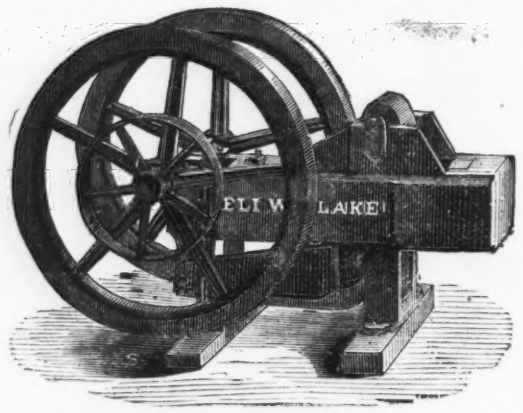

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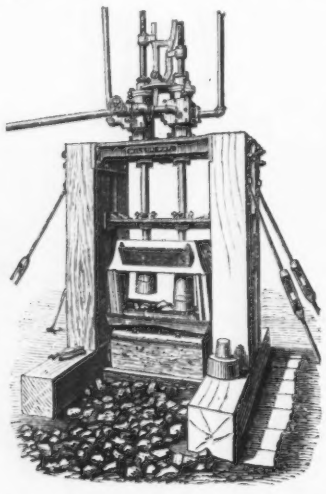

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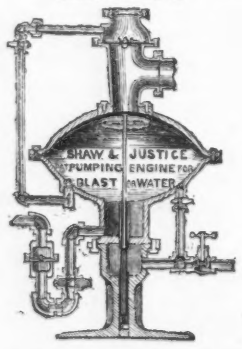

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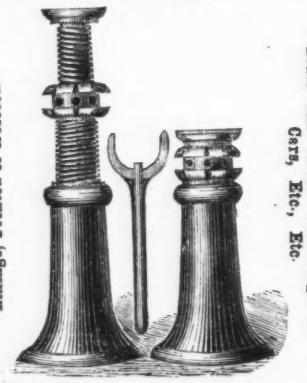

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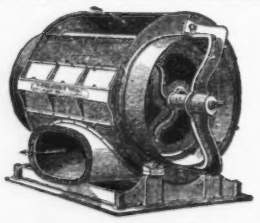

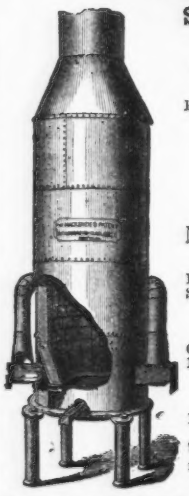

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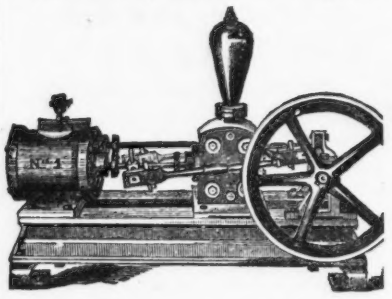

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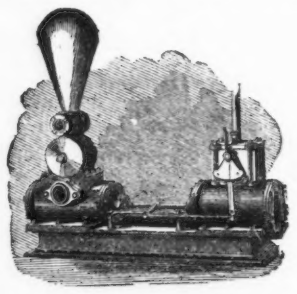

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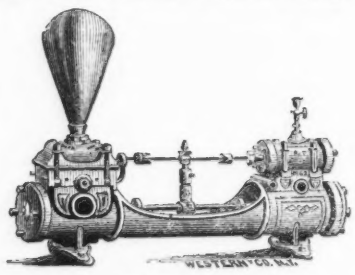

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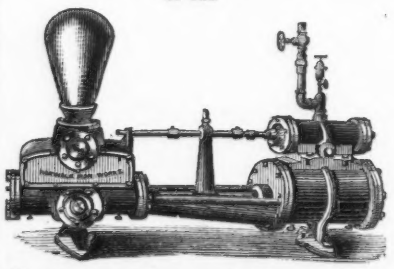

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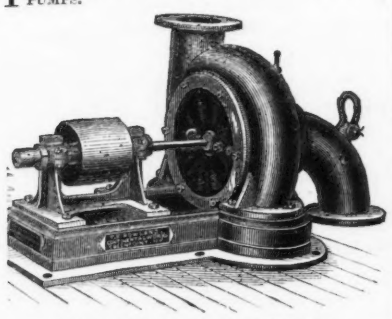

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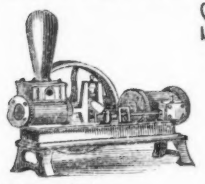

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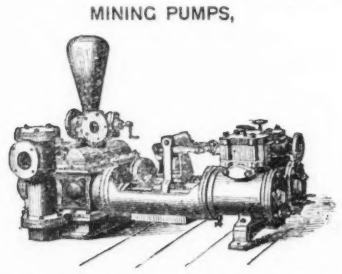

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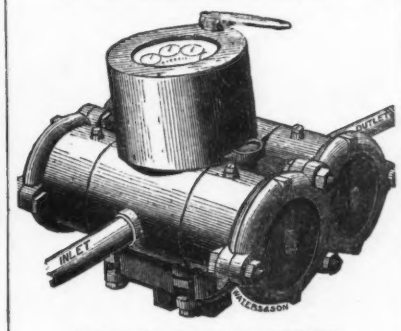

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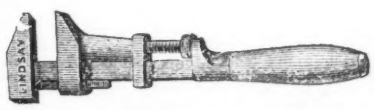

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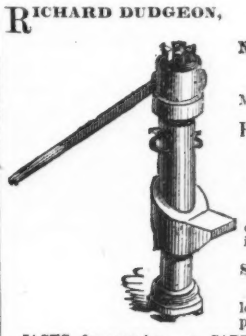

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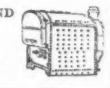

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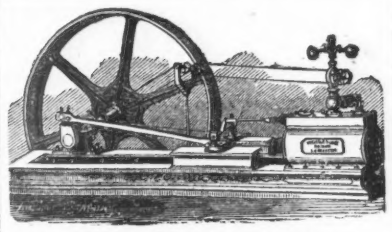

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COMPETITION WITH COALS from PENNSYLVANIA.

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For Districts where Wood is Scarce.

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The machines we offer are suited:

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TO MILL-OWNERS and Country Manufacturers; to be driven by horse-power.

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To Railroad Companies and Manufacturers, we will sell machines at manufacturers' billed prices, they also to pay for transportation and erection; will take for patent and method a proportion of THEIR NET PROFITS, guaranteeing them against loss, and allowing 10 per cent for interest in the capital thus employed (which in case shall exceed $15,000 in order to produce 75 tons per day.)

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For description and illustration see this Journal of August 17th, Vol 8, No. 7. Address

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LEHIGH & SUSQUEHANNA RAILROAD.
(LEHIGH COAL AND NAVIGATION CO.)

Summer Arrangement.

On and after Monday, July 12, 1869, Passenger Trains on the Lehigh & Susquehanna Railroad will run as follows :

DOWN TRAINS.

	No. 1. A.M.	No. 3. A.M.	No. 5 P.M.	No 7. P.M.
Leave Green Ridge	9:05	7:00	1:00	5:15
Scranton	9:10	7:05	1:05	5:20
Pittston	9:36	7:35	1:35	5:52
Wilkesbarre	10:00	8:00	2:00	6:17
White Haven	11:23	A.M.	P.M.	P.M.
Mauch Chunk	12:00			No. 9. A.M.
	1:03			6:50
Catasauqua	2:01			8:04
Allentown	2:10			8:15
Bethlehem	2:20			8:30
Easton	2:48			9:05
Phillipsburg	2:52			9:10
Philadelphia	4:45			A.M.
Arrive New York	6:30 C.R.R.			
	9:40 M. & E.R.R. P.M.			

UP OR NORTHWARD TRAINS :

	No. 2. P.M.			No. 10 A.M.
Leave New York	9:00 C. R. R.			
	8:30 M. & E. R.R.			
Philadelphia	9:45			
Phillipsburg	11:50			7:00
Easton	11:55			7:04
Bethlehem	12:23			7:36
Allentown	12:36			7:50
Catasauqua	12:53			8:04
Mauch Chunk	2:05			9:20
		No. 4.	No. 6.	No. 8.
White Haven	3:23	A.M.	P.M.	P.M.
Wilkesbarre	5:00	8:30	2:25	6:45
Pittston	5:25	8:55	2:50	7:10
Scranton	5:56	9:26	3:20	7:40
Arrive Green Ridge	6:00	9:30	3:25	7:45
	P.M.	A.M.	P.M.	P.M.

Connections.

DOWN TRAIN No. 1, makes close connection at Penn Haven with Lehigh Valley Railroad, for Beaver Meadow, Hazleton and Mahanoy City.

DEL. & HUDSON CANAL CO., R.R.—Up trains Nos. 4 & 6, and down trains Nos. 1 and 7 connect at Green Ridge with trains on Delaware & Hudson Railroad, to and from Carbondale.

NORTH PENNA. R.R.—Down train No. 1, and up train No. 0 connects at Bethlehem with trains on North Pennsylvania R.R , arriving at Philadelphia at 4:45 P.M. Returning, leave Philadelphia for Scranton, Wilkesbarre and Mauch Chunk at 9:45 A.M.

LEHIGH & LACKAWANNA R.R.—Down train Nos. 1 and 0, and up train Nos. 2 and 0 connect at Bethlehem with Lehigh & Lackawanna R. R. for Bath and Chapman Quarries. Returning leaves Bath at 7:00 A.M.

MORRIS & ESSEX R. R.—Down train No. 1 and 0 connect at Easton with Morris & Essex Railroad for Newark and New York. Returning leave New York (Barclay street,) for Scranton, Wilkesbarre and Mauch Chunk at 8:00.

CENTRAL RAILROAD OF NEW JERSEY.—Down trains Nos. 1 and 9 connect at Phillipsburg with trains for New York. Returning, leave New York (foot of Liberty street,) for Scranton, Wilkesbarre and Mauch Chunk at 9:00 A. M.

BELVIDERE & DELAWARE R.R.—Down train No. 0 and up train No. 2 connect at Phillipsburg with Belvidere & Delaware Railroad to and from Trenton and Philadelphia.

MENDES COHEN,
Superintendent.

LEHIGH VALLEY RAILROAD.

ON AND after June 1, 1869, trains on the Lehigh Valley Railroad will run as follows :

DOWN TRAINS.

	A.M	P.M.
Leave Tunkhannock	6.20	
L. & B. Junction	7 30	1.15
Pittston	7.40	1.25
Wilkesbarre	8.00	1.45
White Haven	9 25	3.08
Mauch Chunk	10.35	4.20
Allentown	11.43	5.50
Bethlehem	11 55	6.05
	P.M.	
Easton	12.25	6.35
Philadelphia	2.10	8.35
Arrive New York	3.50	9.00

UP TRAINS.

	P. M.	M.
Leave New York	6.50	12.00
		P. M.
Philadelphia	7.45	1.45
Easton	10.00	3.25
Bethlehem	10.30	4.00
Allentown	10.45	4.20
	M.	
Mauch Chunk	12.00	5.45
	P. M.	
White Haven	1.32	7.18
Wilkesbarre	2.50	8.35
Pittston	3.10	8.55
L. & B. Junction	3.20	9.05
Arrive Tunkhannock	4.30	

☞ No change of cars between Scranton and New York, or between Scranton and Philadelphia.

ROBERT H. SAYRE, Sup't and Eng.
H. STANLEY GOODWIN, Ass't Gen. Supt.
June 1, 1869.

DELAWARE, LACKAWANNA & WESTERN R. R.—Morris & Essex Division.

Summer Arrangement,

Commencing Monday, April 5, 1869, and running on the following time until further notice.

	L. and Express. A. M.	Scranton. Mail. A.M.	Scranton. Express. P. M.
Leave Easton	6.55	11 30	5.30
Washington	7.28	12.10	6.15
Hackettstown	7.48	12.36	6.45
Dover	8.30	1.24	7.30
Rockaway		1.34	
Morristown	9.00	2.00	8.00
Orange		2 50	8.50
Newark	9.50	3.00	9.00
Arrive New York	10.25	3 35	9.40
	A.M.	P. M.	P.M.

RETURNING.

	P. M.	A. M.	A.M.
Leave New York	4.00	7.00	8.30
Newark	4.40	9.05	7.40
Orange			7.53
Morristown	5.33	10.00	8.45
Rockaway			9.09
Dover	6.00		9.20
Hackettstown	6.42	11.05	10.08
Washington	7.02	11.25	10.33
Arrive Easton	7.35	11.57	11.10

Connections.

At Washington, with Delaware, Lackawanna & Western Railroad, for Water Gap, Stroudsburg, Wilkesbarre, Carbondale, Scranton and Great Bend.

At Easton, with Lehigh Valley and Lehigh & Susquehanna Railroads for Bethlehem, Allentown, and Mauch Chunk.

S. SCHOCH,
Ass't Superintendent.

R. A. HENRY,
Gen. Passenger Agent.
Hoboken, N. J., April 21, 1869.

RAILROADS.

READING RAILROAD.

GREAT TRUNK LINE from Philadelphia to the interior of Pennsylvania, the Schuylkill, Susquehanna, Cumberland and Wyoming Valleys, the North, Northwest, and the Canadas.

Summer Arrangement of Passenger Trains, July 12, 1869.

Leaving the Company's Depot, Thirteenth and Callowhill streets, Philadelphia, at the following hours :

MORNING ACCOMMODATION.

At 7.30 A.M. for Reading and all intermediate stations and Allentown. Returning, leave Reading at 6.30 P. M., arrive in Philadelphia 9.15 P.M.

MORNING EXPRESS.

At 8.15 A. M., for Reading, Lebanon, Harrisburg, Pottsville, Pinegrove, Tamaqua, Sunbury, Williamsport, Elmira, Rochester, Niagara Falls, Buffalo, Wilkesbarre, Pittston, York, Carlisle, Chambersburg, Hagerstown, &c.

The 7.30 A. M. train connects at READING with East Pennsylvania Railroad trains for Allentown, &c., and the 8.15 A.M. train connects with the Lebanon Valley train for Harrisburg, &c.; at PORT CLINTON with the Catawissa Railroad trains for Williamsport, Lock Haven, Elmira, &c.; at HARRISBURG with Northern Central, Cumberland Valley, and Schuylkill and Susquehanna trains for Northumberland, Williamsport, York, Chambersburg, Pinegrove, &c.

AFTERNOON EXPRESS

Leaves Philadelphia at 3.30 P.M. for Reading, Pottsville, Harrisburg, &c., connecting with Reading and Columbia Railroad trains for Columbia, &c.

POTTSTOWN ACCOMMODATION

Leaves Pottstown at 6.25 A.M., stopping at intermediate stations; arrives in Philadelphia at 8 40 A. M. Returning, leaves Philadelphia at 4.30 P. M., arriving in Pottstown at 6.40 P.M.

READING ACCOMMODATION

Leaves Reading at 7.30 A.M., stopping at all way stations; arrives in Philadelphia at 10.15 A.M.

Returning, leaves Philadelphia at 5.15 P. M.; arrives in Reading at 8.00 P.M., and connects with Market Train for Pottsville.

Trains for Philadelphia leave Harrisburg at 8.10 A.M. and Pottsville at 8.45 A.M., arriving in Philadelphia at 1.00 P.M. Afternoon trains leave Harrisburg at 2 05 P. M. and Pottsville at 2.45 P.M., arriving at Philadelphia at 6.45 P. M.

HARRISBURG ACCOMMODATION

Leaves Reading at 7.15 A.M. and Harrisburg at 4.10 P.M. Connecting at Reading with Afternoon Accommodation south at 6.30 P.M., arriving in Philadelphia at 9.15 P. M.

MARKET TRAIN, with a passenger car attached, leaves Philadelphia at 12.45 P. M. for Pottsville and all way stations; leaves Pottsville at 5.40 A.M., connecting at Reading with Accommodation Train for Philadelphia and all way stations.

All the above trains run daily, Sundays excepted.

Sunday trains leave Pottsville at 8.00 A.M. and Philadelphia at 3.15 P. M.

Leave Philadelphia for Reading at 8.00 A.M. Returning from Reading at 4.25 P.M.

CHESTER VALLEY RAILROAD.

Passengers for Downingtown and intermediate points take the 7.30 A.M., 12.45 and 4.30 P.M. trains from Philadelphia, returning from Downingtown at 6.10 A.M., 1.00 and 5.45 P.M.

PERKIOMEN RAILROAD.

Passengers for Skippack take 7.30 A.M., 4.30 and 5.15 P.M. trains from Philadelphia; returning from Skippack at 6.15, 8.15, A. M. and 1.00 P. M. Stage lines for various points in Perkiomen Valley connect with trains at Collegeville and Skippack.

NEW YORK EXPRESS, FOR PITTSBURG AND THE WEST.

Leaves New York at 9.00 A. M. and 5.00 and 8.00 P.M., passing Reading at 1.05 A.M., and 1.50 and 10.19 P.M., and connecting at Harrisburg with Pennsylvania and Northern Central Railroad Express Trains for Pittsburg, Chicago, Williamsport, Elmira, Baltimore, &c

Returning, Express Train leaves Harrisburg on arrival of Pennsylvania Express from Pittsburg at 2.35 and 5.20 A. M., 10.55 P. M. passing Reading at 4.30 and 7.05 A. M. and 12.50 P. M.; and arriving at New York at 11.00 A. M. and 12.20 and 5.00 P. M. Sleeping cars accompany these trains through between Jersey City and Pittsburg without change.

A mail train for New York leaves Harrisburg at 8.10 A.M. and 2.05 P. M. Mail train for Harrisburg leaves New York at 12 noon.

SCHUYLKILL VALLEY RAILROAD.

Trains leave Pottsville at 6.30 and 11.30 A. M. and 6 40 P.M., returning from Tamaqua at 8.35 A. M. and 2.15 and 4.15 P.M.

SCHUYLKILL AND SUSQUEHANNA RAILROAD.

Trains leave Auburn at 6.25 A.M. for Pinegrove and Harrisburg, and at 12.10 P.M. for Pinegrove and Tremont; returning from Harrisburg at 6.20 P. M., and from Tremont at 6.45 A.M. and 7.40 P.M.

CENTRAL RAILROAD OF NEW JERSEY.

Passenger and Freight Depot in New York, foot of Liberty street; connects at Hampton Junction with the Delaware, Lackawanna and Western Railroad, and at Easton with the Lehigh Valley Railroad and its connections, forming a direct line to Pittsburgh and the West without change of cars.

ALLENTOWN LINE TO THE WEST.

Three Express Trains to the West, except Sundays, when one train in the evening.

Sixty miles and three hours saved by this line to Chicago, Cincinnati, St. Louis, &c., with but one change of cars.

Silver Palace cars through from New York to Chicago.

SUMMER ARRANGEMENT.

Commencing August 16, 1869.—Leave New York as follows :

6.55 A. M.—For Easton, Bethlehem, Mauch Chunk, Williamsport, Wilkesbarre, Mahanoy City, Tukhannock,

7.15 A. M.—For Somerville.

8.30 A.M.—For Flemington, Junction, Stroudsburg, Water Gap, Scranton, Kingston, Pittston, Great Bend,

9 A. M.—WESTERN EXPRESS.—For Easton, Allentown, Harrisburg and the West, without change of cars to Cincinnati or Chicago, and but one change to St. Louis. Connects at Harrisburg for Erie and the Oil Regions. Connects at Junction for Stroudsburg, Water Gap, Scranton, &c. Connects at Phillipsburg for Mauch Chunk, Wilkesbarre, &c.

12 M.—For Flemington, Easton, Allentown, Mauch Chunk, Wilkesbarre, Reading, Columbia, Lancaster, Ephrata, Litiz, Pottsville, Scranton, Harrisburg, &c.

3.30 P. M.—For Easton, Allentown, Mauch Chunk and Belvidere.

4.30 P. M.—For Somerville.

5.00 P. M.—CINCINNATI EXPRESS.—For Easton, Bethlehem, Allentown, Reading, Harrisburg, Pittsburgh, Chicago and Cincinnati. Sleeping Cars to Pittsburgh and Chicago. Connects at Junction with Delaware, Lackawanna and Western Railroad for all Stations to Scranton.

5.25 P. M.—For Somerville and Flemington.

6 P. M.—For Easton and intermediate stations.

7.00 P. M.—For Somerville.

8.00 P. M.—WESTERN EXPRESS TRAIN.—For Easton, Allentown, Reading, Harrisburg, Pittsburgh and the West—connects at Harrisburg with train for Williamsport, Erie, &c.

8.10 P. M.—EMIGRANT—Stopping only at principal stations.

9.00 P. M.—For Plainfield.

11.45 P. M.—For Plainfield on Wednesdays and Saturdays only.

Sleeping cars through from Jersey City to Pittsburgh every evening.

Trains leave for Elizabeth at 5.45, 6.30, 6.55, 7,15, 8.15, 8.30, 9.00, 9.20, 10.30, 11.40 A. M., 12.00 M., 1.00, 2.00, 3.00, 3.30, 3.45, 4.15, 4.30, 4.45, 5.10, 5.25, 5.45, 6.00, 6.25, 7.00, 7.45, 8.00, 8.10, 9.00, 9.45, 10 45, 11.50 P. M.

Tickets for the West can be obtained at the office of the Central Railroad of New Jersey, foot of Liberty street, N. Y.; at No. 1 Astor House; Nos. 254, 271, 526 Broadway; at No. 10 Greenwich street, and at the principal hotels.

R. E. RICKER, Superintendent.
H. P. BALDWIN, Gen. Pass. Agent.

RAILROADS.

MORRIS AND ESSEX RAILROAD.

DELAWARE, LACKAWANNA AND WESTERN RAILROAD CO. (Lessees). Depots in New York, foot of Barclay street and foot of Christopher street.

Summer arrangements, commencing MONDAY, May 10, 1869.

8.00 A. M.—MAIL TRAIN.—Connecting at Denville with Boonton Branch, at Dover with Chester Branch, at Waterloo with the Sussex Railroad for Andover and Newton, at Washington with the D. L. and W. Railroad for Water Gap, Stroudsburg, Scranton, and Great Bend, and all points on the Lackawanna and Bloomsburg, and Delaware and Hudson River Railroad; at Easton with the Lehigh and Susquehanna Railroad for Bethlehem, Allentown, Mauch Chunk, and Wilkesbarre.

11.30 A. M.—LEHIGH VALLEY EXPRESS—Stops at Newark, Morristown, Dover, Hackettstown, Washington, Phillipsburg, and Easton; connects at Phillipsburg with Bel., Del. Railroad for Belvidere, &c., and at Easton with L. V. R. R. for Bethelehem, Allentown, Mauch Chunk, and Wilkesbarre.

4.00 P. M.—SCRANTON EXPRESS—Connects at Washington with the D. L. & W. R. R. for Water Gap, Stroudsburg, and Scranton at Dover with Chester Railroad, and at Waterloo with Sussex Railroad.

6.30 A. M. and 4.30 P. M.—To Summit and intermediate stations.

6.30, 7.30, 9,30 A. M., and 1.00, 3.40, 5.30, 8.45, 11.45 P. M.—To South Orange and intermediate stations.

11.40 A. M., 3.00 and 6.30 P. M.—To Morristown and intermediate stations.

5.10 P. M.—Morristown Express.

For Newark at 6 30, 7.30, 8.00, 8.30, 9.30, 10.30, 11.00, 11.30, 11.40, A. M., 1.00, 2.00, 3.00, 3.30, 3.40, 3.50, 4.00, 4.30, 5.00, 5.10, 6 10, 6.30, 7.45, 8 45, and 11.45 P. M.

For Bloomfield and Montclair—At 8 30, 11.00 A. M.; 2.00, 3.50, 5,00 and 6.10 P. M.

S. SCHOCH, Assistant Superintendent,
R. A. HENRY, G. P. Agent.

NEW JERSEY RAILROAD—For PHILADELPHIA.

Via Kensington, *6.30 p. m.; on Sundays, via West Philadelphia.

Via Camden, 1 p. m. and 4 p. m.

Via West Philadelphia, 7 a. m., 8.40 a. m., 10 a. m., 12.30 p. m., 5 p. m., *9 p. m., 9.20 p. m., and 12 night.

For Baltimore and Washington—8.40 a. m., 12.30 p. m., *9.26 p. m.

For South and Southwest—8.40 a. m., and *9.20 p. m.

FOR THE WEST.

8.40 a. m., 12.30 p. m., 5 p. m., *9 p. m., and *9.20 p. m.

The 8.40 a. m., and *9 p. m. trains through, with but one change, to Cincinnati and Chicago.

Silver Palace Sleeping Cars attached to the 5 p. m. train run through to Cincinnati and Chicago without change, daily. (Saturdays and Sundays excepted); and on those days to the 9 p. m. train. This is the only line running through cars to Chicago by evening lines.

TICKET OFFICE FOOT OF CORTLANDT ST.

Tickets for sale in Reclining Chair cars can be obtained at foot of Courtland street and 944 Broadway.

May 10th, 1869. F. W. JACKSON,
*Daily. General Superintendent.

STEAMBOATS.

FOR BOSTON
VIA
FALL RIVER DIRECT.
The world-renowned steamers
BRISTOL AND PROVIDENCE,
Commander BRAYTON, Commander SIMMONS.
will leave (alternate days) DAILY
From Pier No. 30 North River,
foot of Chambers-st.,
AT FIVE P. M.
DODWORTH'S CELEBRATED ORCHESTRA.
GRAND PROMENADE CONCERT EVERY EVENING.
This is the only line running a
SUNDAY NIGHT BOAT.

To better accommodate the public the splendid steamers
NEWPORT AND OLD COLONY.
Commander LEWIS, Commander MILLER,
will leave (alternate days) DAILY
(Sundays excepted)
from Pier No. 28 North River,
(foot of Murray-st.,)
AT 6 P. M., FOR BOSTON VIA NEWPORT.
FREIGHT received at Pier No. 30 up to 5 P. M.
and at Pier No. 28 up to 6 P. M. each evening.
JAMES FISK, Jr., President.
M. R. SIMMONS, Managing Director,
CHAS. H. VAILE, General Passenger Agent,
H. H. MANGAM, Freight Agent.
Narragansett Steamship Company.

TROY LINE FOR ALBANY AND TROY.
The fastest, elegant evening river steamboats in the world. The
VANDERBILT and CONNECTICUT
leave Pier No. 44 North River, foot of Spring street,
EVERY EVENING,
Saturdays excepted, at 6 o'clock. and foot of West 34th street at 6:15. Fare only $1 50, being $1 75 less than rail and 75c. cheaper than any other route, and like reduction to Buffalo, Niagara Falls, all points West, to Saratoga, Sharon, Lake George, all points on Lake Champlain, to all points in Vermont and Western Massachusetts. Tickets sold and state-rooms secured at Dodd's Express Offices, Nos. 429 and 944 Broadway, New York, and No. 1 Court street, Brooklyn. Also at No. 308 West street, above Spring street. Passengers landed in Saratoga in time for breakfast.

ALBANY AND TROY DAY LINE.—
CHANGE OF TIME.
The steamboats
C. VIBBARD and DANIEL DREW
will, on and after THURSDAY, July 8, leave Desbrosses street at 8, and 34th street at 8:15, landing at Yonkers, West Point, Cornwall, Newburg, Poughkeepsie, Tivoli, Rhinebeck, Catskill and Hudson. Tickets sold and baggage checked on board the boats to all points on New York Central and Rensselaer and Saratoga Railroads.

PEOPLE'S LINE FOR ALBANY.—THE largest and most magnificent river steamers in the world—The ST. JOHN, DREW and DEAN RICHMOND.
One of the above steamers will leave Pier No. 41, North River, EVERY AFTERNOON (Sundays excepted) at 6 o'clock, arriving at Albany in time to connect with railroad trains West and North. Returning, leave the Albany Steamboat Landing at 7 o'clock P. M., or on the arrival of connecting trains from the West and North. Through tickets can be obtained at the office on the wharf, and baggage checked to its destination. Freight received until the hour of departure.

STONINGTON LINE—TO BOSTON AND PROVIDENCE.
GREAT INSIDE ROUTE—SHORTEST AND MOST DIRECT.
Fare always as low as by any other line.
The new and elegant side-wheel steamers
STONINGTON and NARRAGANSETT,
Capt. WM. M. JONES. Capt. GEO. B. HULL.
From Pier No. 33, foot of Jay st., North River,
at 5 p. m.,
Arriving ahead of all other lines.
Tickets sold and state-rooms secured at No. 2 Astor House, and at Dodd's Express office, No. 944 Broadway.
D. S. BABCOCK,
President Stonington Steamboat Company.

PUBLICATIONS.

THE MINES OF COLORADO:

BY OVANDO J. HOLLISTER.
LATE EDITOR AND PROPRIETOR OF
"THE COLORADO MINING JOURNAL."

The approaching completion of two lines of railway between the Mississippi Valley and the Rocky Mountains, will mark an era in the history of the nearer of the mining Territories—Colorado. It will infuse new life into mining, by giving safe, quick, and reliable communication, reducing freights and risks, thus cheapening supplies and furnishing a most necessary competition in the labor market, under which the production of the precious metals will be largely increased, and the value and importance of property of all kinds will be proportionally enhanced. This cannot fail to arrest the attention of capitalists who are interested in Colorado gold and silver stocks, or are thinking of becoming so. It will be of yet more benefit to that large class whose capital is their muscle, because it will make accessible to them a new and large tract of virgin land, which, though far West, is still on the World's great highway, and therefore in no sense of the word in the backwoods. This region has a pleasant and healthy climate, and while its soil is unsurpassed in strength by that of the prairie States, it has a superior market in the adjoining mines. It most eloquently invites settlement and improvement. It will also give the Summer tourist a choice between the West and the East. It is not hazarding much to say that the Rocky Mountains offer the most delightful Summer resort of the New if not of the Old World. The climate is cool and bracing, the air deliciously pure and soft, the scenery both grand and beautiful, the forests full of game and the streams of trout, with hot mineral springs of high medicinal value boiling up at the root of every shade tree in the sequestered parks. The annexation of the Rocky Mountains to the Union by railways will open a new world to science, a new field of adventure to money and muscle, a new and pleasant place of Summer resort to people of leisure.

To meet the growing want of definite information concerning that interesting country, this book is put forth. It treats of the discovery of gold and settlement of the country, its geography, chorography, geology mineralogy, and agriculture, its early efforts at self government, and the progress and present condition of mining industry, including descriptive list of mining companies, principal improved mines, mills, machinery, and methods of treating ore—in short, it undertakes to give, as concisely and precisely as possible, and without any pretension, all that is known on the subject.

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Show it to your Friends.

THE success which has attended our efforts to provide a first-class Monthly, devoted to the interests of the industrial classes, has far exceeded our most sanguine anticipations. THE MANUFACTURER AND BUILDER has been received with favor by every class of the community. Manufacturers have taken it for the information which it gives in regard to the improved processes in which they are interested; mechanics have taken it for the instruction which it conveys in regard to matters pertaining to special arts and trades; professional and literary men have taken it for the information which it conveys in regard to the progress of the industrial arts; people, in general, have taken it because it contains much pleasant reading matter for the family circle. That all these classes have been right in their estimate of this journal, will be evident to any one who will read the Table of Contents which we here append. When we state that these articles are almost all derived from original and authoritative sources, it will be seen that we have presented a body of **PRACTICAL, THOROUGH, AND RELIABLE INFORMATION,** such as can nowhere else be obtained for the sum charged for a year's subscription to THE MANUFACTURER AND BUILDER.

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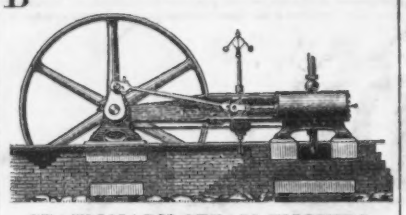

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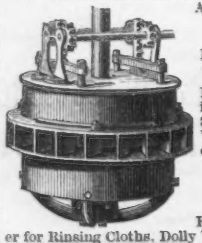

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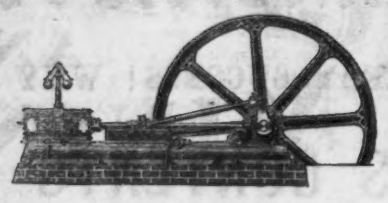

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